



Chronology of KSC and KSC Related Events for 1997

Elaine E. Liston



Chronology of KSC and KSC Related Events for 1997

Elaine E. Liston, Sherikon Space Systems, Kennedy Space Center, Florida



FOREWORD

This 1997 Chronology is published to describe and document KSC's role in NASA's progress.

Materials for this Chronology were selected from a number of published sources. The document records KSC events of interest to historians and other researchers. Arrangement is by date of occurrence, though the source cited may be dated one or more days after the event.

Materials were researched and prepared for publication by Archivist Elaine E. Liston. For the added convenience of researchers, each entry has been headlined.

Comment on the Chronology should be directed to the John F. Kennedy Space Center, Archives, LIBRARY-E, Kennedy Space Center, Florida, 32899. The Archivist may also be reached by e-mail at Elaine.Liston-1@ksc.nasa.gov, or (407) 867-2407.



Table of Contents

January	1
February	26
March	47
April	67
May	93
June	111
July	126
August	152
September	172
October	191
November	208
December	222
Appendix A	240



JANUARY

January 2:

NASA LAUNCHES CHOICE FOR KSC CHIEF

NASA wants a retired astronaut and Air Force general to be the next director of Kennedy Space Center. Maj. Gen. Roy D. Bridges, Jr., who once was in charge of unmanned launches at the Air Force's Cape Canaveral base, was chosen by NASA's top managers to be the new KSC director, NASA spokesman Brian Welch said. The job isn't formally Bridges' yet because intricate bureaucratic rules dictate how to fill senior executive positions. NASA's selection still has to be approved by the federal Office of Personnel Management, an agency outside NASA. Bridges, 53, was one of three finalists for the job. NASA will not reveal the other two, Welch said. He would replace Jay Honeycutt, who announced his retirement in October after 37 years of government service. From 1989 to 1990, Bridges was commander of the Eastern Space and Missile Center at Patrick Air Force Base. He also was pilot of the space shuttle Challenger (STS 51F) in 1985. If approved, Bridges would become KSC's seventh center director since the space center opened in 1962. [The Orlando Sentinel, Jan. 3, 1997, p A-7. Florida Today, Jan. 4, 1997, p 1A.]

January 3: SHUTTLE BOOSTERS SAFE TO FLY, ENGINEERS CONCLUDE

A group of NASA engineers has concluded that shuttle Atlantis' boosters are safe to fly, which might clear the ship for launch Jan. 12 to the Russian space station Mir (STS-81). The Solid rocket boosters were under scrutiny after unusual erosion marred those used on NASA's last two shuttle flight of 1996 -- a September launch of Atlantis and a November liftoff of Columbia. Although seen on two successive flights, the booster erosion is not severe and does not endanger the shuttle and its crew, officials have said repeatedly. [Florida Today, Jan. 3, 1997, p 2A.]

January 4: KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT

Status for STS-81/Atlantis, 5th MIR docking and Spacehab DM, is currently on Pad 39B. Holiday outage deconfiguration is in work for all three orbiters at KSC. The payload bay doors were reopened today to gain access to the airlock C-hatch. Functional tests on C-hatch, scheduled for today, will conclude the hatch actuator testing on Atlantis. Main propulsion system tests are scheduled for tonight. STS-82/Discovery, Hubble Space Telescope Servicing Mission 2, is located in the Orbiter Processing Facility bay 2. Preparations to open the payload bay doors are in work. The ku-band antenna retest and payload testing will continue today. Discovery's aft compartment close-outs are also in work. In the VAB, preparations are in work to mate the orbiter to the external tank. STS-83/Columbia, Microgravity Science Laboratory 1, is located in the Orbiter Processing Facility bay 1. Preparations are underway to open Columbia's payload bay doors. STS-83 booster stacking operations continue in the VAB. The left aft booster has been mated and preparations are

underway for stacking of the left aft center segment. [Bruce Buckingham. (1997). **Kennedy Space Center Space Shuttle Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [1997, January 4].]

January 6:

CAPE HAS A NEW CHALLENGER

In the cold shipyards of Scotland and Norway, work is under way on a project to use a floating launch platform longer than a football field to send rockets and their satellites into space from sea. The Boeing Co.-led international venture, called the Sea Launch Co. is the first of its kind and more than a novel way to get payloads into orbit. It could be a serious threat to Cape Canaveral Air Station, where U.S. companies are fighting to keep their share of the world's commercial launch business. The new company was formed in April 1995 when Boeing, the Russian space agency and private companies in Norway and the Ukraine joined hands. Although military rockets have been launched from ships since the late 1940s, Sea Launch is the first attempt to move commercial space missions off land. What makes the venture potentially attractive to companies, and such a threat to the Cape, is that it will be the only launch site to be directly on the equator. That's critical because most communication satellites must be placed into equatorial orbits to do their jobs. By launching from that spot, satellite manufacturers could get an added benefit not found at the Cape, where rockets take off 30 degrees north of the equator. A trajectory from the Cape requires the rockets to use more fuel to get their payload into the right orbit. If all goes according to plan, the first rocket should take off from the sea platform in June 1998 carrying a Hughes Communications satellite. [**Florida Today**, Jan. 6, 1997, p 1A - 2A.]

AEROSPACE INDUSTRY OUTLOOK

Strengths are anticipated with a growth spurt in telecommunications industry requiring scores, perhaps hundreds of new satellites, and those satellites will need commercial rockets to reach orbit. The Delta and Atlas rockets have solid brand names and reliable histories, an important selling point when newer rockets keep failing. Weaknesses are the core design of U.S. commercial rockets, particularly the Delta, Atlas and Titan, are decades old and not as cost- and personnel-efficient as those of foreign competitors. Opportunities are newer versions of the Delta, Atlas and Titan are coming soon. A revamped Launch Complex 46 opens at Cape Canaveral in February for Lockheed's, Orbital Sciences' and Alliant Technology's smaller rockets. The new, smaller Lockheed Martin Launch Vehicle gets its first Cape launch this year. Lockheed also is developing Venture Star, a possible replacement for NASA's space shuttle. And Kennedy Space Center may see more work as the international space station becomes more of a reality. Threats are competitors to the Cape's launch business keep popping up -- in Virginia, Alaska, New Mexico, California and even in Russia, Ukraine, China and Japan. Many other countries, especially those in Europe, heavily subsidize their launch industry, making it harder for U.S. firms to compete.

[The Orlando Sentinel, Jan. 6, 1997, p A-12.]

ASTRONAUT CLIFFORD LEAVES NASA SPACE PROGRAM

Astronaut Michael "Rich" Clifford, a three-time shuttle veteran, departed NASA on January 6 to join Boeing Company as flight operations manager the International Space Station. Clifford joined NASA in July 1987 as a Space Shuttle Vehicle Integration engineer and was subsequently selected as an astronaut in 1990. His three Shuttle missions are STS-53 in December 1992, STS-59 in April 1994 and STS-76 in March 1996. [NASA News Release #97-5, Jan. 8, 1997.]

WASHINGTON OUTLOOK - REPRIEVE

A new Fiscal 1998 budget being drawn up at the White House will likely contain rosier projections. NASA's Fiscal 1998 budget, which had been slated to drop to \$13.1 billion, could come in several hundred million dollars higher, and steep cuts planned for the following two years will likely be scaled back a good bit. [Aviation Week & Space Technology, Jan 6, 1997, p 21.]

WASHINGTON OUTLOOK - SPACE SHUFFLE

With Rep. F. James Sensenbrenner, Jr. (R-Wis.) likely to ascend to the chairmanship of the House of Representatives Science Committee, the top spot on the panel's space and aeronautics subcommittee appears to be open, and Rep. Dana Rohrabacher (R-Calif.) is the odds-on favorite to fill it. If he gets the job, look for Rohrabacher to push NASA hard to commercialize the international space station. On the Senate side, Conrad Burns (R.-Mont.) is expected to ditch the chairmanship of the Commerce Committee's science panel for a more visible subcommittee. Not that a change would have a huge impact -- the Senate hasn't even passed a NASA authorization bill since 1992. One possible replacement for Burns is Kay Bailey Hutchinson (R-Tex.). Meanwhile, both Rep. Jerry Lewis (R-Calif.) and Sen. Christopher Bond (R-Mo.), who chair the House and Senate appropriations panels that fund NASA, are expected to stay on. [Aviation Week & Space Technology, Jan 6, 1997, p 21.]

IN ORBIT - NASA'S JET PROPULSION LABORATORY

NASA's Jet Propulsion Laboratory and Spectrum Astro Inc. have drawn up a plan to launch the first spacecraft to Mercury since 1973. The Hermes Mercury Orbiter was one of 34 proposals submitted for the latest round of NASA's low-cost Discovery missions. The proposal calls for Hermes to launch in August, 2002, and begin a polar elliptical orbit of Mercury in December, 2004. The 1,980-lb (fully fueled) spacecraft would image all of Mercury at a 1-km. resolution. Mariner 10, the only other spacecraft to visit Mercury, imaged only 45% of the planet in 1973. [Aviation Week

& Space Technology, Jan 6, 1997, p 64.]

IN ORBIT - RUSSIA CONSIDERING REMOVING DOCKING SYSTEM

The Russian Space Agency is considering removing the Kurs automatic docking system from its manned Soyuz transports, requiring Soyuz pilots to make manual rendezvous and docking maneuvers with the Mir space station. Soyuz pilots have always been trained to do manual dockings as a backup to the automatic system and have used the procedures several times when the Kurs system malfunctioned. Automatic dockings have been standard procedure in the Russian operations on the six Salyut stations and Mir. In contrast, U. S. Gemini, Apollo and shuttle mission dockings have been completely manual. [Aviation Week & Space Technology, Jan 6, 1997, p 64.]

January 7: CLIPPER GRAHAM INCIDENT REPORT RELEASED

An unconnected hose led to the destruction of the Clipper Graham technology demonstrator last summer. The Clipper Graham (DC-XA) Incident Investigation Board has released its final report concerning the July 31 post-landing tip-over and fire which destroyed the 43-foot vertical takeoff and landing vehicle at White Sands Missile Range, NM. The Board, Chaired by former Astronaut Vance Brand, concluded "The primary cause of the vehicle mishap was that the brake line on the helium pneumatic system for landing gear #2 was not connected. This unconnected brake line prevented the brake mechanism from being pressurized to release the brake and resulted in landing gear #2 not extending. The vehicle became unstable upon landing, toppled onto its side, exploded and burned." The rocket, named "Clipper Graham" for the late Gen. Daniel O. Graham, was part of a program by the National Aeronautics and Space Administration to develop another generation of reusable launch vehicles to carry payloads into orbit. [Florida Today, Jan. 8, 1997, p 2A. NASA News Release #97-3, Jan. 7, 1997.]

January 9: SATURN V CENTER A BLAST FROM PAST FOR ASTRONAUTS

Ten Apollo astronauts returned to KSC to take part in a black tie gala grand opening of the Apollo-Saturn V Center. The facility houses a 363-foot-long Saturn V rocket like those that catapulted seven crews on voyages to the moon. In attendance were Buzz Aldrin (Apollo 11), Richard Gordon (Apollo 12), Edgar Mitchell (Apollo 14), Charlie Duke (Apollo 16), Walter Cunningham (Apollo 7), Thomas Stafford (Apollo 10), Rusty Schweickart (Apollo 9), Gene Cernan (Apollo 10 and 17), William Anders (Apollo 8) and John Young (Apollo 10 and 16). An original lunar lander, the upper most parts of an Apollo launch gantry and a restored Launch Control Center Firing Room also are on display at the museum, which is three to four miles west of KSC's twin launch pads. Two theaters are also featured at the museum, and for the returning Apollo astronauts, its opening was a reunion and a trip down the proverbial memory

lane. Just the sight of the museum's sleek Saturn V rocket, which recently was restored to near-mint condition as part of a \$1.7 million makeover, was enough to make Gene Cernan and his colleagues marvel. The Saturn V, which rusted in the rain and corrosive salt air in front of KSC's 52-story Vehicle Assembly Building for more than 20 years, is the largest space program artifact ever restored. [Florida Today, Jan. 9, 1997, p 1A - 2A.]

RUSSIA'S DESIGN MAY BE THREAT IN SPACE

Insufficient shielding on sections of the international space station that the Russians are building nearly triples the risk that the entire station could be pierced by space debris, said a 50-page report by the National Research Council, part of the private, non-profit National Academy of Sciences. Because the station is interconnected, the increased risk affects the entire structure, the report said. The National Aeronautics and Space Administration is working with Russia to come up with ways to fortify Russian parts after they are launched into orbit, said NASA orbital debris program manager George Levin. NASA engineers believe that even if the station is designed properly, an object will penetrate the structure once every 48 years. But those odds go up to once every 17 years because of the vulnerable Russian sections. While the Russian components represent the biggest problem, the research council came up with improvements NASA should make, too. The report noted that the space debris is coming from angles NASA hadn't originally anticipated, so more shielding is needed. NASA's Levin said those changes will be made. [The Orlando Sentinel, Jan. 9, 1997, p A-7.]

KIDSAT BRINGS SPACE SHUTTLE EXPERIENCE TO CLASSROOMS

The Space Shuttle Atlantis (STS-81), scheduled for launch Jan. 12, will support the second flight of KidSat, NASA's pilot education program that uses an electronic still camera aboard the Shuttle to bring the frontiers of space exploration to 15 U.S. middle school classrooms via the Internet. The three-year pilot program is a partnership between NASA's Jet Propulsion Laboratory (JPL), the University of California at San Diego (USCD), and the Johns Hopkins University Institute for the Academic Advancement of Youth (JHU-IAAY). [NASA News Release # 97-6, Jan. 9, 1997.]

SPACE SHUTTLE MISSION WEB PAGE GETS NEW LOOK FOR 1997

The STS-81 NASA Shuttle Web page goes on-line today with a new look and feel designed to improve speed and ease navigation. Several new features have been added to the popular page. The internet address remains the same for all Shuttle missions at: <http://shuttle.nasa.gov/> Visitors to the remodeled site will find the latest, daily updated information on the STS-81 mission, and a new menu bar that takes them even more

quickly and easily to the features that spark their interest. [NASA Internet Advisory #I97-1, Jan. 9, 1997.]

January 10:

REASSIGNMENT OF KEY PERSONNEL

The following Senior Executive Service assignments are effective immediately. James L. Jennings is designated Acting Deputy Center Director. He currently serves as Director, Administration Office. Bobby G. Bruckner is designated Director of Payload Processing pending final approval by NASA Headquarters. He has served as Director, Payload Ground Systems in the Payload Processing Directorate since 1994. Sterling W. Walker is designated Director of Engineering Development pending final approval by NASA Headquarters. He has served as Director, Mechanical Engineering in the Engineering Development Directorate since 1991. Warren I. Wiley is designated Deputy Director of Engineering Development pending final approval by NASA Headquarters. He is currently Deputy Manager, Launch Integration in the Space Shuttle Program. [KSC Announcement, Jan. 10, 1997.]

ANN MONTGOMERY ASSIGNED AS ACTING DIRECTOR OF LOGISTICS OPERATIONS

Ms. Ann D. Montgomery is appointed Acting Director of Logistics Operations. Her assignment is effective immediately and intended to facilitate ongoing operations pending completion of buyout replacement personnel actions. [KSC Countdown, Jan. 16, 1997. Memoranda, Jan. 10, 1997.]

SMOKE MAY HAVE DAMAGED SHUTTLE LAB

Smoke from a fire in a Kennedy Space Center spacecraft processing building might have damaged a shuttle laboratory, but its planned launch in April isn't expected to be delayed, NASA officials said Friday. Set for launch April 3 aboard shuttle Columbia, the European-built Spacelab module was enveloped in smoke Thursday when a power supply near the trailer-sized lab short-circuited and caught fire, officials said. The fire was quickly brought under control, but engineers are concerned that smoke from the blaze might have contaminated parts of the lab. The lab is to be moved this month from the KSC Operations and Checkout Building to a shuttle hangar for installation in Columbia's cargo bay. Seven astronauts will work in two shifts within the lab, conducting research experiments around the clock during a planned 16-day flight. [Florida Today, Jan. 11, 1997, p 4A.]

KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT

STS-81/Atlantis, 5th MIR Docking and Spacehab DM, on Pad 39B. The six-member crew for mission STS-81 arrived at KSC's Shuttle Landing Facility last night at 10 p.m. and the countdown for launch began as scheduled at 7 a.m. today at the T-43 hour mark. No technical issues are being worked at this time and Atlantis is on

schedule for launch at 4:27 a.m. Sunday. At the pad, aft engine compartment and solid rocket booster close-outs are complete. Today, preparations are under way to load cryogenic reactants into the power reactant storage and distribution system onboard the orbiter. The pad will be cleared at midnight and cryogenic loading will commence at about 3:30 a.m. tomorrow. Weather forecasters are currently indicating only a 30 percent chance of weather violations on launch day. The primary concern is for possible low ceilings or fog. The temperature at the pad at launch time is expected to be about 44 degrees; relative humidity about 89 percent; clouds possibly as low as 500 feet, then scattered at 3,500 feet and 10,000 feet and broken at 25,000 feet; pad winds from the north at 3-5 knots; and no precipitation is forecast. STS-82/Discovery, Hubble Space Telescope Servicing Mission 2, is located in Orbiter Processing Facility bay 2. Final close-outs in the payload bay are complete and the doors will be closed tonight. Airlock and aft engine compartment close-outs are also set to be completed later today. Roll over to the Vehicle Assembly Building is targeted for late Saturday afternoon (January 11). In the Vehicle Assembly Building, Discovery will be mated to the external tank and solid rocket boosters. STS-83/Columbia, Microgravity Science Laboratory 1, is located in Orbiter Processing Facility bay 1. Preparations continue to removal of the Space Shuttle main engines this weekend. Pressure checks of fuel cell No. 2 and payload bay door radiator functional tests are complete. Stacking of the solid rocket boosters in the Vehicle Assembly Building continues. [Bruce Buckingham. (1997). Kennedy Space Center Space Shuttle Status Report [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [1997, January 10].]

January 11: COLD WEATHER COULD PUT CHILL ON SHUTTLE LAUNCH

NASA officials will halt Sunday's (January 12) scheduled 4:27 a.m. launch if they detect ice on the external fuel tank. If too much ice is on the shuttle's massive external fuel tank, Atlantis will not launch toward its fifth meeting with the Russian space station Mir. The launch will be scrubbed if ice forms on the tip of the shuttle's tank, which is filled with 500,000 gallons of liquid fuel supercooled to minus 423 degrees. The launch also will be called off if ice is more than 1/16th of an inch thick on certain other areas of the tank. Even though ice has never caused a shuttle launch to be scrubbed, the conditions are ripe for too much ice Sunday: a predawn launch, chilly temperatures, a north wind and high humidity. Besides the ice concerns, NASA's meteorologists say there's a 30 percent chance that the weather could prevent the shuttle launch. Meteorologists worry about low clouds and temperatures getting too cold for the shuttle and its boosters to work safely. [The Orlando Sentinel, Jan. 11, 1997, p A-1 & A-10]

LININGER TO NASA: NO BAD NEWS, PLEASE

With a pregnant wife, a year-old son and a big extended family, astronaut Jerry Lininger has made it clear to NASA: Hold the bad news during the 4 ½ months he

will be in space. With spaceflights getting longer and space fliers and their families getting younger and younger, this is a new area for NASA -- whether and how to break bad news from home to astronauts in orbit. NASA officials could not recall any instance in which they had to decide whether to break tragic news to an astronaut in space. NASA would hesitate to shorten a mission because of a family emergency unless the astronaut became seriously depressed. Likewise, Linenger has been warned that if his shuttle flight home is delayed, the space agency won't take any extraordinary measures to bring him back in time for the birth of his child. [Florida Today, Jan. 11, 1997, p 4A.]

January 12:

RUSSIA'S SPACE PROGRAM FALTERS

Russian and American space officials have been gathering at Kennedy Space Center as NASA prepared to launch the space shuttle Atlantis early this morning. Atlantis is supposed to dock with the Russian space station Mir on the fifth of nine meetings, but the talk at KSC went beyond the shuttle-Mir program. NASA, Russia and other countries are partners in the \$43 billion planned international space station, of which NASA is paying \$29 billion. Much of the talk was not about NASA's money, but Russia's lack of it. With the Russian government in a financial crisis, the space agency that used to enjoy lots of cash and success is struggling in many ways. A few of those problems are: There are no spare Soyuz launch vehicles in case of emergencies. So NASA's shuttle fleet is supplying 40 percent of Mir's food and equipment; Russia's launch site hasn't paid its power bills and keeps getting its electricity shut off; Because contractors weren't getting paid, the Russians are eight months behind in building the service module, a crucial component of the international station. The Russians have had space stations in orbit since 1971. NASA is paying Russia \$471 million for the shuttle-Mir program to tap into that expertise. "We've learned a great deal from our Russian partners in doing this," said NASA shuttle-Mir manager Frank Culbertson. [The Orlando Sentinel, Jan 12, 1997, p A-16.]

ATLANTIS EN ROUTE TO RUSSIAN STATION AFTER PREDAWN LIFTOFF

The countdown for launch of Atlantis on mission STS-81 proceeded smoothly and launch occurred on time. Launch Director James Harrington joked that the only hitch in Atlantis' countdown and launch was that the shuttle "was a little bit slow, 42 milliseconds (42 one-thousandths of a second late)." Atlantis is scheduled to remain in orbit for about 10 days and land back at Kennedy Space Center on Jan. 22. Returning with Atlantis will be John Blaha, ending his four month stay on the Mir space station. The crew of STS-81 are: Commander Michael Baker, Pilot Brent Jett, and Mission Specialists Jeff Wisoff, John Grunsfeld, Marsha Ivins, Jerry Linenger (up), and John Blaha (down). Blaha has been living on the station with cosmonauts Valery Korzun and Alexander Kaleri. Soon after Atlantis docks at Mir, Blaha will move his gear to the shuttle and turn over his post on the station to astronaut Jerry Linenger. Linenger

will become the fourth NASA guest on the station, where he will live until another Atlantis crew returns for him in May with his replacement. [Bruce Buckingham. (1997). **Kennedy Space Center Space Shuttle Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe/shuttle-status [1997, January 12]. **Florida Today**, Jan. 13, 1997, p 1A. **The Orlando Sentinel**, Jan. 13, 1997, p A-5.]

THRILLER AUTHOR TOM CLANCY PENS SHUTTLE LAUNCH ACCOUNT

As soon as the space shuttle Atlantis spiraled into space, novelist Tom Clancy began to write a 1,500-word piece for *Mongo Park*, an online magazine on Microsoft's Internet Web site. Nathan Myhrvold, the computer giant's No. 2 executive and chief technology officer, was doing the same. To find their work, go to <http://www.msn.com>. Microsoft wooed Clancy to do the writing job with such perks as a VIP tour of Kennedy Space Center, the chance to see a live launch from a prime viewing spot and some pay. Clancy toured the center Saturday and immediately ran into an abundance of his fans. NASA employees showed Clancy the inside of the Vehicle Assembly Building and the launch pad in exchange for autographs. Clancy confessed to being a space fan for most of his life. He last watched a launch in 1983 from Patrick Air Force Base. [**The Orlando Sentinel**, Jan. 13, 1997, p A-5.]

SPACE CENTER ATTRACTION IS SOARING SUCCESS

Considering that the Saturn V attraction at the Kennedy Space Center Visitor Center opened in mid-December, executives expected the holidays to be busier than normal. But even their most optimistic projections didn't compare to the crush of people packing the attraction in recent weeks. On the busiest day, Dec. 27, 20,000 people visited the space center. It was a 78 percent increase over the same day last year. [**The Orlando Sentinel**, Jan. 13, 1997, p A-5.]

LOCALS MAKE 'CONTACT'

A new film by "Forrest Gump" director Robert Zemeckis is called "Contact" and stars Jodie Foster as a radio astronomer at Kennedy Space Center who makes contact with life in outer space. Lure of being in movies draws 2,300 extras which will be used in a scene to be shot Feb. 1 in which they watch a space shuttle launch from one of Brevard County's causeways. Which causeway at which the scene will be shot is being kept a secret so there isn't a mob of spectators that day. The screenplay was written by Carl Sagan, and the film is scheduled to open in the summer. [**Florida Today**, Jan. 13, 1997, p 1B.]

January 14:

SMOOTH DOCKING AWAITS SHUTTLE

The space shuttle Atlantis is on a near-perfect flying streak. NASA hopes to stretch that unusual string of good luck when Atlantis docks tonight with the Russian space station MIR. The 10:53 p.m. docking, the fifth in 18 months, is Atlantis' main job. Atlantis weighs 232,761 pounds and Mir weighs 298,189 pounds. Joining the two is a delicate task that NASA has made routine. Commander Michael Baker, in an interview from Atlantis, said: "I expect the rendezvous and docking to go very much like it goes in the simulator, which is normally very smooth." The job begins today at 8:14 p.m., when Baker will fire Atlantis' engines to get in the right position to meet up with Mir. If everything looks good, Baker will nudge Atlantis up to Mir until the flowerlike petals on Atlantis' docking ring connect with a similar ring on Mir. [The Orlando Sentinel, Jan. 14, 1997, A-7.]

ASTRONAUT THAGARD'S SUIT TO SMITHSONIAN

The Smithsonian's National Air and Space Museum got the space suit astronaut Norman Thagard wore while heading to the Russian space station Mir for his 4-month stay. Thagard was joined by astronaut Shannon Lucid and cosmonaut Yuri Usachev in Washington for the presentation. Thagard was the 1st American to ride aboard a Russian rocket on March 14, 1995. He was returned to earth onboard the shuttle Atlantis (STS-71) on July 7, 1995. [The Orlando Sentinel, Jan. 15, 1997, A-10. Space Shuttle Mission Chronology, 1995, Jan. 1996, p 7.]

JAPANESE RECOGNIZE ASTRONAUT WITH POEM

Japan's imperial family honored an astronaut's journey and a city's recovery from a earthquake in poems read Tuesday at an annual New Year's ceremony. The ceremony is part of palace tradition dating back about 700 years. Empress Michiko, wearing a long white dress, read a poem about Japanese astronaut Koichi Wakata, who flew on the space shuttle Endeavour (STS-72) last year. As translated by the Imperial Household Agency, the poem reads: "It was a blue planet, Distinct in darkness, Bearing signs of life. So describing the earth from afar The astronaut has returned." [The Orlando Sentinel, Jan. 15, 1997, A-10.]

January 15:

MIR WELCOME BASH OUT OF THIS WORLD

Rife with mechanical noises, the Russian space station Mir is never quiet. And now it's getting even louder. Mir, which in Russian means peace, has become anything but peaceful. Early Wednesday, six astronauts from the space shuttle Atlantis arrived to cheers, applause and a loud "welcome, welcome, welcome" from a boisterous John Blaha. Blaha, a U.S. astronaut who has been on Mir since September, will hitch a ride home with Atlantis next week. "You could hear lots of yelling and laughing and happy noises, and I think that kind of tells it all," NASA shuttle-Mir program director

Frank Culbertson said. "The Mir crew had not seen any other humans since the last time the shuttle was there (Sept. 23, 1996, STS-79). Adding to the commotion will be a few refrains of "Happy Birthday" for new Mir resident Jerry Linenger, who turns 42 on Jan. 16, 1997. [The Orlando Sentinel, Jan. 16, 1997, p A-5.]

January 16:

ATLANTIS OVERHAUL TO BE DONE OUT WEST

NASA will ship shuttle Atlantis to California in September for a \$50 million overhaul despite a report from its own inspector general that says millions could be saved by doing similar work here. Critics say the decision to base the work at Boeing North America's shuttle manufacturing facility in Palmdale rather than at Kennedy Space Center is politically motivated. Senior NASA officials said Thursday the agency doesn't want to pile extra work at KSC as it goes through a difficult and unprecedented move to turn over day-to-day shuttle operations to a private company. "We knew that we were going to be going through this transition at the same time," said former shuttle astronaut Steve Oswald, who now is director of space shuttle requirements at NASA headquarters in Washington. "And having Kennedy Space Center do modifications of a magnitude of which they had never attempted before, while they were trying to get their ducks in a row with the new single prime contractor, just didn't make any operational sense -- regardless of price and political concerns," Oswald said.

Atlantis is to be ferried to the Palmdale shuttle plant in late September for an 11-month overhaul that will include removing an air lock from its crew cabin and refitting it in the shuttle's cargo bay. The work is required before Atlantis can be launched on missions to assemble the agency's planned \$40 billion international space station, which is to be raised in orbit between November 1997 and June 2002. The Atlantis overhaul also calls for technicians to install fuel lines that would be used to transfer propellant to the international station if a cash-strapped Russian space program is unable to deliver spacecraft intended to do the same job. In addition, an extra set of liquid hydrogen and liquid oxygen storage tanks for the system which generates electricity to power the shuttle also is to be installed during the refurbishment.

NASA routinely sidelines each of its four shuttle orbiters once every three years for extensive structural inspections and systems modifications. The work has been performed almost exclusively at U.S. Air Force Plant 42 in Palmdale. The location of the shuttle overhaul work, which accounts for 486 jobs in Palmdale, has been a political football for a while. [Florida Today, Jan. 17, 1997, p 1A & 6A.]

SHUTTLE CALL STUMPS RADIO AUTO MECHANICS

"Car Talk" auto repair gurus Tom and Ray Magliozzi got a puzzler Thursday that they just couldn't figure out for their show on National Public Radio. Seems a caller named "John from Houston" was having a problem with his vehicle. "I occasionally

drive this government vehicle...and twice it's done a very funny thing, and I thought maybe you guys could help me with it," the caller told the Magliozzi's, also known to a nationwide audience as "Click and Clack, the Tappet Brothers." "When I first start it up, it starts great. It accelerates really, really well. then it runs incredibly rough, though, for about two minutes," the caller said. "Then after the first two minutes -- after this really rough ride -- there's kind of a jolt. And then it runs smooth, but only for about six-and-a-half more minutes. And at that point the engine dies. It stops completely." What the Magliozzi's didn't know was that the guy on the other end of the line was NASA astronaut John Grunsfeld, who just happened to be calling from shuttle Atlantis, which is linked up to Russia's space station Mir some 242 miles above Earth. The vehicle in question, of course, was Atlantis, which bolted off its launch pad last Sunday and gave its crew a shake-and-rattle ride for two minutes -- until the shuttle's twin solid rocket boosters were jettisoned into the Atlantic Ocean. The remainder of the supersonic ride in space was smooth as glass until the shuttle's three liquid-fueled main engines shut down as scheduled six-and-a-half minutes later. The radio show hosts finally put the puzzler together when Grunsfeld reminded the pair that they used to work on his Sunbeam Alpine in their auto repair shop. [Florida Today, Jan. 17, 1997, p 6A.]

ADMINISTRATOR DAN GOLDIN COMMENDS KSC FOR STS-81 SUPPORT

In Administrator Dan Goldin's agency-wide teleconference earlier this week, he asked Center Director Jay Honeycutt to pass on his appreciation to the KSC workforce for their outstanding performance during the launch of STS-81 this past weekend. Goldin went on to say that he had received several positive comments from his guests and particularly wanted to single out the launch team for their flawless handling of a demanding launch with a very tight window. He also cited the guest services support team for their professionalism in assisting him and his guests throughout the launch. [KSC Countdown, Jan. 16, 1997.]

MARS ASSIGNED TO HEAD KSC "ISO" PROJECT OFFICE

Center Director Jay Honeycutt has announced the establishment of the "ISO" Project Office at KSC and the assignment of Charles B. Mars to head the new organization. In his new role, Mars will report directly to the deputy center director, with responsibility for managing KSC preparations for ISO certification. The ISO program, in effect, describes requirements for an effective quality system. The agency-wide ISO program requires certification of both technical and administrative program areas. [KSC Countdown, Jan. 16, 1997.]

January 17:

ORGANIZATIONAL REASSIGNMENT

Mr. David A. Wansley is appointed Deputy Director, Procurement Office effective

immediately. Mr. Wansley will serve as Acting Chief, Acquisition Management Office and as Acting Small Business Specialist. [Memoranda, Jan. 17, 1997]

BLAHA TELLS CLINTON TO BUILD STATION

From his home in orbit, astronaut John Blaha recorded a video message Friday to be played during President Clinton's inaugural ball Monday night (Jan. 20). In the taped note Blaha -- who is nearing the end of a four-month odyssey on the Russian space station Mir -- plugged NASA's plan to start building a \$40 billion international station late this year. "We're now embarked on a new program -- a bridge to the 21st century which President Clinton initiated 3 1/2-years ago -- where we entered a cooperative agreement to build a new space station together with the Russians," Blaha said. "In the interim we have been using our space shuttle and the Russian Mir space station, which is 11 years old, to conduct joint space operations." The Air Force colonel's remarks are to be played during the president's shindig at the National Air and Space Museum. [Florida Today, Jan. 18, 1997, p 7A.]

DELTA 2 ROCKET EXPLODES

The Air Force is continuing an investigation into the explosion of a Delta 2 rocket that showered the ground with flaming debris and sent a toxic cloud over the Brevard County coast. No injuries were reported as a result of the blast, which destroyed the \$55 million unmanned rocket and its cargo -- a \$40 million advanced military navigation satellite (NAVSTAR Global Positioning System satellite). The cause of the accident -- which occurred 13 seconds after liftoff as the rocket reached 1,589 feet above launch pad 17A-- remained unknown late Friday. Possible culprits, however, include a failure of the rocket's first-stage engine or any of its nine strap-on solid rocket boosters, officials said. The McDonnell Douglas Delta rocket fleet will remain grounded until the probe is complete and any necessary repairs are made to the rockets, which are considered the most reliable in the world. As a result, 16 satellite-delivery missions planned this year from Cape Canaveral and Vandenberg Air Force Base in California are on hold. Of 241 Delta launches since 1960, Friday's was only the 14th failure. The last catastrophic Delta failure was 10 years ago (May 1986), and the last low-altitude Delta failure, caused by a different type solid motor, was nearly 20 years ago in 1977. Standing 12 stories tall, the Delta blasted off from Cape Canaveral Air Station at 11:28 a.m. and quickly exploded, sending a huge fountain of burning fuel and wreckage through cold, cloud-packed skies. Most of the debris fell near the launch pad, sparking small fires in the palmetto scrub that burned for more than an hour. Seventy-three launch team members were safely holed up in a concrete blockhouse within the length of a football field of the launch pad. But about 150 launch guests were quickly evacuated to an air station hangar from grandstands four miles from the pad. [Florida Today, Jan. 18, 1997, p 1A & 6A. Florida Today, Jan. 18, 1997, p 7A. The Orlando Sentinel, Jan. 18, 1997, p A-1. Aviation Week & Space Technology, Jan 27, 1997, p 30-33.]

CRACK SCARES NASA, BUT LAUNCH PLATFORM FOR SHUTTLE WILL BE OK

The space agency had a scare Friday while moving shuttle Discovery to its launch pad for a planned Feb. 11 liftoff to service the Hubble Space Telescope. The move was halted temporarily when technicians heard a loud bang and discovered a 24-foot-long crack in the surface of the shuttle's mobile launch platform. After studying the crack for four hours, engineers decided it would not interfere with the launch. The launch platform is a two-story steel structure 160 feet long and 130 feet wide. After the shuttle is mated to its fuel tank and two booster rockets, it is connected to the launch platform, which travels with it from the Vehicle Assembly Building to the pad. The shuttle then launches from the platform. NASA has three such platforms. "We're going to continue studying it, but the assessments from the engineers is that it's just a superficial crack," said NASA spokesman Bruce Buckingham. He said it likely could be fixed by welding or adding a steel plate on top of the cracked area. ["Blaha tells Clinton to build station," Florida Today, Jan. 18, 1997, p 7A. The Orlando Sentinel, Jan. 18, 1997, A-16.]

ASTRONOMER WHO FOUND PLUTO DIES

Clyde Tombaugh, the astronomer who discovered the planet Pluto, died at the age of 90. Tombaugh discovered Pluto, the ninth planet from the sun, in 1930 when he had just turned 24. [The Orlando Sentinel, Jan 19, 1997, p A-5.]

GOES-K WEATHER SATELLITE ARRIVES AT KSC

The GOES-K weather satellite, to be launched aboard an Atlas I rocket in late April, arrived today at KSC by C-5 air cargo plane from the manufacturing plant in Palo Alto, CA. GOES-K is the third spacecraft to be launched in the new advanced series of geostationary weather satellites for the National Oceanic and Atmospheric Administration. The launch of the Atlas I/GOES-K is currently planned for April 24 at the opening of a launch window extending from 1:56-3:19 a.m. [KSC Countdown, Jan. 16, 1997.]

MARS GLOBAL SURVEYOR STATUS REPORT

Per a recent MGS flight operations report, the Mars Global Surveyor was 14,79 million kilometers from the Earth and moving in an orbit around the sun at a velocity of 31.32 kilometers per second. The Surveyor's orbit is expected to intercept Mars on Sep. 12, 1997. [KSC Countdown, Jan. 16, 1997.]

January 19:

**MS. SHANNON D. BARTELL APPOINTED DIRECTOR,
PAYLOAD FLIGHT SYSTEMS**

Effective January 19, 1997, Ms. Shannon D. Bartell was appointed to the Senior Executive Service position of Director, Payload Flight Systems in the Payload Processing Directorate. Bartell was assigned as deputy director, International Space Station Launch Site Support (ISSLSS) in April 1996, and later assumed the duties of acting director, Payload Flight Systems. Prior to her ISSLSS position, Bartell served as chief of the Payload Processing Division. [KSC Announcement, Jan. 22, 1997. KSC Countdown, Jan. 28, 1997.]

PANEL NAMED TO PROBE DELTA EXPLOSION

Col. Ron Haekel, operations group commander of the 30th Space Wing at Vandenberg Air Force Base, will lead the nine-member panel of Air Force officials who will search for the cause of the explosion of an unmanned Delta rocket. [Florida Today, Jan. 19, 1997, p 1A.]

SECRET SPACE TUG MIGHT START STATION

A space tug like one flown on top-secret Department of Defense missions is being considered by NASA as an interim control module for the agency's planned \$40 billion international space station, a senior NASA official says. NASA will decide this month whether to rush into production the Naval Research Laboratory craft, which would be used to keep early station components in orbit should Russia not be able to deliver a key command and control center for the outpost. The agency also will consider a plan to finance and build a Russian control module to do the job, NASA space flight chief Wil Trafton said. NASA decided to pursue options for an interim control module last month when it became apparent the Russian Space Agency would not be able to deliver the station's so-called Service Module on time for an April 1998 launch. The Service Module, which is expected to be launched in December 1998, is to provide living quarters for crews during station construction as well as propulsion systems needed to keep the outpost aloft. The NRL tug would cost less than \$100 million to build, Trafton said. It would be paid for out of financial reserves from NASA's annual \$2.1 billion station budget. [FLORIDA TODAY, Jan. 19, 1997, p 1E.]

ATLANTIS LEAVES MIR, HEADS HOME

John Blaha and five other astronauts started the journey back at 9:15 p.m. Sunday, when shuttle Atlantis slipped away from the Russian space station Mir and flew twice around the outpost before settling a course for Earth. The two spacecraft parted about 200 miles above Russia, just southeast of Moscow. Earlier in the day, the Russian and Atlantis crews embraced and wished each other well before closing the hatches between their spacecraft. It was the fifth time the shuttle has docked at Mir. Atlantis

could return to Kennedy Space Center as early as Wednesday, but NASA officials will decide today whether to extend the flight until Thursday so the crew can do more tests on an experimental piece of exercise equipment. [Florida Today, Jan. 20, 1997, p 1A.]

January 20: CLINTON OUTLINES OPTIMISTIC VISION OF FUTURE

President Bill Clinton was sworn in for his second term Monday outside the U.S. Capitol in Washington, D. C., by Chief Justice William Rehnquist. [Florida Today, Jan. 21, 1997, p 1A.]

January 21: SHUTTLE HOOK-UP WINS RAVE REVIEWS

They may not have been the first to resupply the Russian space station Mir, but the current crew of the space shuttle Atlantis did the best job, NASA officials said. The Atlantis crew was extremely efficient in transferring water, equipment and food between the shuttle and Mir. Mission Operations Director Bob Castle said last week that the astronauts probably were so efficient because they were left on their own to decide how best to handle the job. This is the second mission that NASA has taken such a hands-off approach to the transfers. Atlantis continued to have remarkably few problems Monday, when astronauts successfully performed a treadmill experiment that had failed last week. Because the experiment worked Monday, NASA managers decided not to extend Atlantis' flight. Landing is set for 7:48 a.m. Wednesday at Kennedy Space Center. [The Orlando Sentinel, Jan. 21, 1997, p A-4.]

CAST-OFF PARTS FROM DAYS OF SPYING
WILL HELP U.S., RUSSIA LINK IN SPACE

Remnants of the once ultra-secret worlds of U.S. and Russian military space surveillance will literally open up to each other in space next year. NASA will buy a U.S. Navy-built space vehicle that used to help America spy on the Soviet navy. That vehicle, called a Titan Launch Dispenser, will temporarily replace a crucial Russian section of the international space station, a top NASA station official said. Then in the fall of 1998 that vehicle will attach to a Russian-built part of the space station, called the Functional Energy Block. That block was once part of Russia's secret military spy program, experts said. They will fly in space together for about a year. NASA's decision last week to buy the Titan Launch Dispenser will cost the space agency less than \$100 million for the space vehicle, said Andrew Allen, NASA's director of space station requirements. But this new vehicle, which NASA calls an interim control module, will require another space shuttle flight to put it in place -- another \$450 million. [The Orlando Sentinel, Jan. 22, 1997, p A-8.]

OFFICIALS NARROW CAUSES OF DELTA BLAST

Air Force investigators are zeroing in on the cause of Friday's Delta rocket explosion while tallying damages that left a Cape Canaveral launch complex looking like a bombarded war zone. Although the exact cause remains unknown, officials say the rocket's first and second stages might have inadvertently separated, setting off an automatic destruct system that triggered the blast. Other possible culprits: a rupture of the rocket's first-stage metal casing or propellant tanks within the stage. Failure of one of the Delta's nine strap-on solid rocket boosters also is a possibility, officials say. Falling debris from the 493,000-pound rocket also left gaping craters in the ground at the complex as well as paved roads leading to it. Four of 20 to 30 administrative trailers at the site burned to the ground. About 20 of about 30 cars parked at the complex were damaged or destroyed. "The damage was very fragmented," said Air Force Maj. Ingrid Bradley, director of public affairs at the 45th Space Wing. Bradley said neither the rocket's launch pad nor tower, which was built in 1956 for \$3.5 million, sustained substantial damage. Minor damage also was done at the nearby Air Force Space & Missile Museum, but none of the rockets on display was damaged. [Florida Today, Jan. 22, 1997, p 2A.]

January 22:

ATLANTIS BRINGS A WOBBLY BLAHA HOME

Astronaut John Blaha on Wednesday experienced the weighty burden and uplifting joy of coming home after four months in space. After Atlantis landed smoothly at 9:23 a.m., Blaha tried to stand up but had to sit right back down, said NASA Flight Crew Operations Chief Dave Leestma. Blaha told workers that he felt like "he weighed 1,000 pounds," Leestma said. Unlike his predecessors Shannon Lucid and Norm Thagard who walked off the shuttle on their own power, Blaha was carried off. That was good for scientists who want to study how months in near-zero gravity changes the body. When astronauts stand up, their bodies start readjusting to gravity. But any added weight Blaha felt returning to Earth was soon lightened by a surprise that NASA Administrator Dan Goldin brought up to the shuttle, Blaha's wife, Brenda. This was the first time a family member has been allowed to come to the shuttle unloading area after a mission. Blaha underwent several medical tests at Kennedy Space Center on Wednesday and will return to Houston tomorrow. His 128-day odyssey is the second-longest spaceflight for a U.S. astronaut. His predecessor on Mir, Shannon Lucid, holds the American record of 188 days in space. [The Orlando Sentinel, Jan. 23, 1997, p A-14. Florida Today, Jan. 23, 1997, p 1A & 7A.]

KSC ORDERED TO REPLACE ALL OF ITS OLD NASA LOGOS

During a visit to Kennedy Space Center, NASA Administrator Dan Goldin said too many worms. The worm Goldin wants eliminated is a NASA logo, one that pre-dates his five-year tenure. Soon after he took over the National Aeronautics and Space Administration in 1992, Goldin changed the 1970s NASA logo. He ordered the

agency to return to the original logo, that NASA workers call the meatball because the agency's acronym sits on top of a blue ball. Goldin said he wanted the changeover to be done when regular maintenance work is performed so that there is no extra cost. But 4 1/2 years later, the old logos remain in obvious places, including on the shuttle. Goldin has made his displeasure clear. KSC had been changing the worm to the meatball whenever something needed repainting, following Goldin's original orders. Now KSC will shuffle its maintenance schedule to make sure worms are eradicated. "Those that are more visible we're ensuring that they get a priority," KSC Director Jay Honeycutt said. But when Goldin complained about the old logo on the space shuttle, Honeycutt said it was out of his hands. KSC launches the shuttles, but the program is run by the Johnson Space Center in Houston. [The Orlando Sentinel, Jan. 23, 1997, p A-14.]

January 23: NASA NAMES ACTING SPACE STATION DIRECTOR

NASA's Associate Administrator for the Office of Space Flight Wilbur C. Trafton today named Gretchen W. McClain to the position of Acting Director of Space Station Requirements at the Agency's Washington headquarters. McClain replaces astronaut Lt. Col. Andrew M. Allen, who is retiring from the U.S. Marine Corps. [NASA News Release #97-15, Jan. 23, 1997.]

LEARY'S FINAL TRIP ON HOLD

Due to technical difficulties, Timothy Leary's final trip to space has been delayed. Leary died in May at age 75. At his request, the remains of the LSD prophet were to be launched into space aboard a commercial satellite last fall. Problems with an unrelated launch, however, pushed the blastoff back. Leary wanted Celestis Inc. of Houston to pack his ashes into a small, aluminum capsule for the trip. Joining him will be the ashes of "Star Trek" creator Gene Roddenberry. Relatives are scheduled to gather Feb. 15 at Vandenberg to watch a plane take off with the rocket in tow. The plane will land in Spain, where the satellite will be attached to the rocket for a scheduled March 11 launch. The rocket will soar 300 miles above Earth. Each family, which paid \$4,800, will also get a commemorative video of the launch. [Florida Today, Jan. 23, 1996, p 7A.]

PROPELLANT LEAK FORCES EVACUATIONS AT KSC

A small fire at a power distribution plant and a near-simultaneous propellant leak at the shuttle launch pad triggered evacuations Thursday at Kennedy Space Center. No injuries were reported in the 2:15 p.m. fire or the propellant leak, which came two minutes later and created a small toxic cloud four miles away at launch pad 39B. The back-to-back alarms caused the 30-minute evacuation of 200 to 300 people at the KSC Vehicle Assembly Building, the Launch Control Center and the launch pad. The fire, which erupted at a power substation near the assembly building, was extinguished

quickly. The propellant leak occurred while pad workers were purging a nitrogen tetroxide line with a neutralizing solution. A pressure valve on a 55-gallon drum being used to collect residual propellant burst and spewed the plume, which dissipated in about five minutes. [FLORIDA TODAY, Jan. 24, 1997, p 1A.]

January 24:

ROY BRIDGES SELECTED AS KSC'S
NEW CENTER DIRECTOR

Former shuttle astronaut and retired Air Force Maj. Gen. Roy D. Bridges, Jr., has been named by NASA Administrator Daniel S. Goldin to be the director of the Kennedy Space Center (KSC). Bridges, who will become the seventh KSC center director effective March 2, will succeed Jay F. Honeycutt, who announced his retirement last October. As director, Bridges will be responsible for managing NASA's only site for processing and launch of the Space Shuttle vehicle at a rate of seven to eight flights per year; processing of the payloads flown on both the Shuttle and expendable launch vehicles; and overseeing of expendable launches carrying NASA payloads. He will manage a team of about 2,000 NASA civil servants and about 14,000 contractors. As a NASA astronaut, Bridges served as pilot for the Space Shuttle Challenger on STS 51-F in July and August 1985. Bridges later served as the director of requirements, Headquarters Air Force Materiel Command, Wright-Patterson Air Force Base, OH, from June 1993 until his retirement from the Air Force on July 1, 1996. In that position he served as the command focal point for product management policy, processes and resources. Prior to his assignment at Wright-Patterson, Bridges was the commander, Air Force Flight Test Center, Edwards Air Force Base, CA. He has served in several key leadership positions in the Air Force, including deputy chief of staff, test and resources, Headquarters Air Force Systems Command, Andrews Air Force Base, MD; commander, Eastern Space and Missile Center, Patrick Air Force Base, FL; and commander, 6510th Test Wing, Edwards Air Force Base, CA. Bridges was born July 19, 1943, in Atlanta, GA, and graduated from Gainesville High School, CA, in 1961. He is a distinguished graduate of the U.S. Air Force Academy, Colorado Springs, CO, earning a bachelor's degree in engineering science in 1965. He received a master of science degree in astronautics from Purdue University, IN, in 1966. [NASA News Release #97-17, Jan. 24, 1997.]

KENNEDY SPACE CENTER SPACE SHUTTLE STATUS REPORT

STS-82/Discovery, Hubble Space Telescope Servicing Mission 2. The pad is closed today for scheduled operations to load hypergolic propellants into the orbiter's reaction control system. On Sunday, the Rotating Service Structure will be retracted away from the vehicle for a hot fire test of the three auxiliary power units Sunday evening. On Monday, the payloads will be delivered to the pad's payload change-out room. STS-83/Columbia, Microgravity Science Laboratory 1. The right hand orbital maneuvering system pod has been removed from the orbiter. Payload premate tests and installation of the Ku-band antenna are in work today. Wing-to-fuselage bolt

torque checks are continuing. Stacking of the right hand solid rocket booster in the Vehicle Assembly Building is scheduled for completion this weekend. STS-84/*Atlantis*, 6th MIR Docking & Spacehab DM. Off-load of residual cryogenic reactants from the orbiter's power reactant storage and distribution system is complete. Access to the aft engine compartment is in work and the payload bay doors are scheduled to be opened on Monday. [Bruce Buckingham. (1997). **Kennedy Space Center Space Shuttle Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe/shuttle-status [1997, January 24].]

MIR A HOME ON THE WANE

A human refuge in the heavens, the Russian space station Mir has dodged all kinds of perils during its nearly 11 years in orbit. Ever since the communist government that built it crumbled in 1991, economic troubles have strangled the station's financial lifeline and fueled recurring rumors that Mir would be sold or abandoned. Things got so bad in 1992 that Mir's cosmonauts even threatened to strike when their paychecks shrank to a paltry \$6 per month. Through it all, Mir has persevered, providing a home to 58 cosmonauts and 17 guests. Among them is U.S. astronaut Dr. Jerry Linenger, who was ferried to Mir last week aboard shuttle *Atlantis* to replace fellow American John Blaha. But it is now a near certainty that Mir will not survive much longer. Russian officials say they will abandon the venerable outpost in three years or less because of continuing money problems. When Mir's hatches are sealed for good it will mark the end of a remarkable achievement -- the world's first almost continuously manned and operated space station. [**Florida Today**, Jan. 24, 1997, p 1A & 2A.]

HOPES DIM FOR CROPS IN SPACE

Two wheat plants grown aboard the Russian space station Mir produced a seedless crop, dashing scientists' hopes of one day producing a perpetual food supply for long space voyages. The first crop, grown from seeds planted in August, was harvested in December and found to be seedless. More seeds were planted on Dec. 6 and those, too, produced a seedless crop that was harvested 40 days later. Russian and American scientists plan to study samples of the experiments. [**The Orlando Sentinel**, Jan. 24, 1997, p A-5.]

January 25:

FORMER NASA ENGINEER DIES IN CAR CRASH

Robert L. Jones, co-developer of the space helmet used by Apollo astronauts during the late 1960s and 1970s was killed in a traffic accident, officials said Saturday. Jones worked for NASA in the human factors engineering department during the early Apollo space missions. He headed a team of engineers who designed the space suits worn by astronauts during the race to land a man on the moon. [**The Orlando Sentinel**, Jan. 26, 1997, p A-9.]

January 27:

SEVERAL SERVICES TO MARK ANNIVERSARY OF APOLLO 1

Kennedy Space Center Director Jay Honeycutt will speak about the future of the space program in Brevard County during Titusville's 11th Annual Astronaut Memorial Ceremony on Tuesday, the anniversary of the 1986 shuttle Challenger accident. Kennedy Space Center's Visitor Center will have a public ceremony dedicated to the Apollo 1 crew at the Astronauts Memorial. A private ceremony for family members will be conducted that evening at the site of the accident. The Apollo 1 (AS-204) accident occurred on January 27, 1967 at 1831 EST when fire broke out in the command module during a pre-launch test on Launch Complex 34. The fire resulted in the deaths of astronauts Virgil I. (Gus) Grissom, Edward H. White, II, and Roger B. Chaffee. The space shuttle Challenger accident occurred on January 28, 1986, at 11:39 a.m. Seventy-three seconds after liftoff, an explosion claimed the crew and vehicle. STS-51L crewmembers included Commander Francis R. Scobee, Pilot Michael J. Smith, Mission Specialists Judith A. Resnick, Ellison S. Onizuka, Ronald E. McNair, Teacher in Space Sharon Christa McAuliffe and Payload Specialist Gregory B. Jarvis. [Florida Today, Jan 26, 1997, p 5A. A Summary of Major NASA Launches, Jul. 1980, p V-17. Space Shuttle Mission Chronology, Mar. 1996, p 9.]

EMERGENCY PLANS BEING DRAWN UP FOR OCT. LAUNCH

While visions of a Delta rocket explosion linger in local memory, Brevard County officials are moving ahead with emergency plans for the October launch of a rocket carrying a nuclear-powered NASA probe toward Saturn. Set for liftoff Oct. 6 from Cape Canaveral Air Station, a Titan rocket is to put the space agency's Cassini probe on a course that eventually will take it on a tour of Saturn, its rings and its moons. By the time the rocket begins its 11-minute climb into orbit, county and other officials will have spent thousands of hours preparing for any accident. Representatives from NASA and county, state and federal agencies will sit down this week, continuing meetings that began in 1995. The groups are planning a table-top launch day rehearsal in June, to be followed by a full-scale practice session in the fall. Their plans include a worst-case scenario in which a rocket explosion would vaporize the probe's plutonium pellets and send a radioactive mist over Brevard. Because they have been preparing for every contingency, nothing new is being done in response to the Air Force's Delta accident this month, officials said. [Florida Today, Jan 27, 1997, p 1A-2A.]

NASA TO CUT 1,600 JOBS

As part of NASA's effort to reduce its budget, officials at the Jet Propulsion Laboratory in Pasadena, Calif., said the lab will privatize some operations to eliminate almost 1,600 jobs during the next three years. The scientific facility, long at the cutting edge of satellite and deep space research, indicated two years ago that its

operations would be scaled back after the federal budget was cut for space exploration and research. JPL, the largest employer in the Pasadena area, has a work force of about 6,300 people. Officials want to reduce the agency's work force to 4,800 by farming out administrative and mission control work to private industry. Companies with winning bids would be obligated to hire JPL employees whose jobs are being eliminated by the contract, said JPL Deputy Director Larry Dumas. [Florida Today, Jan 27, 1997, p 2A.]

APOLLO 1 CREW REMEMBERED

It happened 30 years ago when a fire consumed the Apollo 1 spacecraft during a launch pad test. A handful of Apollo 1 family members gathered at the Astronaut Memorial in Titusville for a ceremony to honor the crew. Called heroes, brave explorers and "simply the best," the Apollo 1 astronauts were remembered for their sacrifice as well as their achievement. They were not sad on the anniversary of the Jan. 27, 1967, accident, just proud. "It's a great feeling to be here -- very positive," Ed White III said. "It's just good to know that the positive feelings will live on." The Apollo 1 crew left something beyond dear memories for their families. They left a legacy of improved safety for the astronauts who followed them and eventually landed on the moon. Astronaut Pam Melroy, who works on the KSC team that straps shuttle astronauts into their seats, said she often has visited the site of the Apollo 1 fire at Launch Complex 34. The abandoned site at Cape Canaveral Air Station is in disrepair, but the lessons learned from the fire are on her mind every time she helps an astronaut get ready for a liftoff, Melroy said. "The influence of the Apollo 1 crew reaches today in my procedures at the pad and in the shuttle. They have directly affected the safety and success of every subsequent spaceflight." [Florida Today, Jan 28, 1997, p 2A.]

TITUSVILLE FIRM AWARDED PAD FIRE SUPPRESSION SYSTEM UPGRADE CONTRACT

The HM2 Corporation, Titusville, FL, has been awarded a \$3.2 million firm fixed price contract to upgrade and modernize the Firex fire suppression system at Kennedy Space Center's Space Shuttle launch pad 39A and 39B. The small business firm began work under the contract Jan. 27 and is scheduled to complete the work within two years of the startup date. The work is necessary to modify and replace elements of the 30-year-old system that protects the Space Shuttle, payloads and launch facilities from fire at the pads. [KSC Countdown, Feb. 6, 1997.]

January 28:

KEY PERSONNEL ASSIGNMENT

Effective immediately, Mr. Sterling Smith is designated Acting Director, Payload Ground Systems in the Payload Processing Directorate. Mr. Smith will continue to carry out the responsibilities of his present position as Deputy Director of Payload

Processing. [KSC Announcement, Jan. 28, 1997.]

ANNIVERSARY OF SPACE SHUTTLE CHALLENGER

On January 28, 1986, the space shuttle Challenger exploded 73 seconds after liftoff from Kennedy Space Center, killing all seven crew members; flight commander Francis R. "Dick" Scobee; pilot Michael J. Smith; Ronald E. McNair; Ellison S. Onizuka; Judith A. Resnik; Gregory B. Jarvis; and schoolteacher Christa McAuliffe. [The Orlando Sentinel, Jan 28, 1997, p A-3.]

January 29:

BOOSTER PROBLEM WON'T DELAY LAUNCH

NASA's search for answers to a puzzling booster problem is forcing the agency to do some unexpected work this weekend on shuttle Discovery. But officials said the extra labor will not delay the shuttle's planned Feb. 11 launch on a mission to service the Hubble Space Telescope. The work involves replacing the plugs inside both of Discovery's solid rocket boosters. Meant to protect the boosters from contamination while the shuttle sits on the launch pad, the plugs are blown out of the rockets during liftoff. Discovery's original plugs were lodged in place with an adhesive that has become a suspect in the agency's search for the cause of an unusual booster problem seen on two flights last year. During a September launch of Atlantis and a November launch of Columbia, hot gases eroded channels into the insulation that lines at least one of the shuttles' nozzles. That uncharacteristic erosion is puzzling to NASA engineers, who think the problem is related to distortions on the way insulation is applied to the nozzle. However, they also suspect that another unknown factor is contributing to the erosion. This particular batch of adhesive had been used on the two flights where the problem was seen. "It's coincidental, it's interesting, and it leads our engineers to say it could be a contributor," said June Malone, spokeswoman at Marshall Space Flight Center in Huntsville, Ala. [Florida Today, Jan 29, 1997, p 1A.]

PILOT WILL BE HONORED ON KSC MEMORIAL

The stroke of a general's pen Wednesday was expected to end a bitter, six-year controversy and rescue from obscurity a man many consider to be the nation's first black astronaut. Air Force Vice Chief of Staff Gen. Thomas S. Moorman signed a letter that awarded astronaut status to Maj. Robert Lawrence, a black pilot who died in a 1967 crash before completing his astronaut training. The move clears the way for the Astronaut Memorial Foundation to etch Lawrence's name into the shiny black granite of the Space Mirror, viewed each year by millions of visitors to Kennedy Space Center. "Our goal would be to get this done by December, the anniversary of his accident," said Astronaut Memorial Foundation President Jim DeSantis. Lawrence's selection won't be official until mid-February, when the AMF board is expected to vote. A joint AMF-NASA committee is expected to be formed next week to make the official recommendation. AMF officials have said the foundation -- which

has a racially mixed board and has approved women and minority candidates for the memorial -- did not allow Lawrence's name on the monument because he lacked the official Air Force designation as an astronaut. [Florida Today, Jan 30, 1997, p 1A.]

January 30: LOGISTICS OPERATIONS ORGANIZATIONAL CHANGES

Due to the retirement of Mr. William I. Moore, effective February 3, 1997, Mr. Timothy R. Bollo is designated Acting Chief, Materials Science Division. Effective February 3, 1997, Mr. Gregory A. Opresko is designated Acting Chief, On-site Operations Division, replacing Mr. Bollo. [Memoranda, Jan. 30, 1997.]

TITAN LAUNCH DELAYED

The planned liftoff of an Air Force Titan rocket has been delayed until no earlier than Feb. 13 because workers have fallen behind launch preparations. The rocket is to carry a satellite that can spot missile launches anywhere in the world. [Florida Today, Jan 30, 1997, p 2A.]

1ST ASTRONAUT DOCTORATE GIVEN LOCALLY

"Dr. Gus Grissom" is how the late astronaut could have been addressed, 4 1/2 years before he died in the Apollo 1 fire being memorialized this week. "In June 1962, Gus Grissom was awarded the first honorary doctorate granted by Florida Tech," writes Karen Rhine, communications specialist for the university founded in 1958 as Brevard Engineering College and later renamed Florida Institute of Technology. The award was also a national "first." Karen quoted the school's founding president, Dr. Jerome Keuper, as saying the U.S. government "gave Brevard Engineering College the privilege and distinction of being the first college in the United States to confer an honorary degree upon an astronaut." Grissom was named a doctor of space science at the school's second commencement. Only days after the Apollo 1 fire of Jan. 27, 1967, Florida Tech commemorated its tie with Gus Grissom by renaming a building for him. South Hall, a dormitory, became "Grissom Hall," according to Gordon Patterson, the university's humanities professor and historian. [Florida Today, Milt Salamon, Jan 30, 1997, p 12A.]

**January 31: NASA MANAGERS SET FEB. 11 AS LAUNCH DATE
FOR SECOND SHUTTLE SERVICING MISSION TO
HUBBLE SPACE TELESCOPE**

Following completion of a flight readiness review meeting, NASA managers set Feb. 11 as the official launch date for NASA's second Shuttle mission of the year. The mission, designated STS-82, is the second in a series of planned servicing missions to the orbiting Hubble Space Telescope (HST). Following rendezvous with and retrieval of the HST on the third day of the mission, four space walks on four successive days

will take place as the astronauts remove and replace various HST components. Work performed on the telescope will significantly upgrade the scientific capabilities of the HST and keep the telescope functioning smoothly until the next scheduled servicing mission in 1999. A crew of seven astronauts is to make the 10-day journey. The launch is set between 3:56 a.m. and 5:01 a.m. Discovery would return to Kennedy Space Center for a night landing Feb. 21. [NASA News Release #97-21, Jan. 31, 1997. Florida Today, Jan 31, 1997, p 1A.]

MARS PROBE PICKING UP GIBBERISH

Pathfinder's communication unit has a slight malfunction, but the problem shouldn't hinder its landing. A NASA probe heading to Mars to look for signs of life is picking up strange signals, and it hasn't even neared the Red Planet. Luckily, the signals are gibberish, and the spaceship's computer is ignoring them. So the problem should hinder NASA's plan to launch the \$196 million probe on Mars on July 4, mission manager Richard Cook said. But the communication device causing the problem is also acting up on another probe and is the same type that is on the \$1 billion Cassini probe, which will be launched in October for a journey to Saturn. Engineers are looking at the Command Detector Unit, or CDU, on Cassini to see whether something can be done. The device was designed at NASA's Jet Propulsion Lab in California. "It's just kind of confusing as to why it's happening," Cook said of Pathfinder's problems. The CDU, a small but critical communication device, is about 4 inches square and 1 inch thick. It is the second of three pieces of equipment that must work in sequence to receive command from Earth. Pathfinder's problem may stem from something inside the detector unit, perhaps even with the unit's coatings, NASA spokesman Doug Isbell said. A special team of engineers is investigating the issue, especially because a probe called NEAR, launched a year ago, also has a balky CDU, Cook said. [The Orlando Sentinel, Jan 31, 1997, p A-5.]

During January: USA CELEBRATES QUALITY CERTIFICATION

United Space Alliance's Integrated logistics Division recently achieved ISO 9001 certification for quality. This achievement, the first for USA or any organization at Kennedy Space Center, was celebrated in January in ceremonies at the NASA Logistics Depot In Cape Canaveral. [The Brevard Technical Journal, Feb 1997, p 6.]

FEBRUARY

February 1:

HARDWARE FOR TITAN IV ARRIVES

The first vehicle hardware for the Air Force Titan IV rocket that will launch the Cassini spacecraft has arrived at Cape Canaveral. The Centaur upper stage booster arrived in Florida aboard an Air Force C-5 cargo plane and was off-loaded on Saturday (Feb. 1). It is now located in the Vertical Integration Building (VIB) in the Air Force's Titan complex, where it will undergo processing. [KSC Countdown, Feb. 4, 1997.]

February 2:

5 KSC EMPLOYEES GET SILVER SNOOPY

Five Kennedy Space Center workers have joined the ranks of NASA's Silver Snoopy award-winners. Winners were Brad R. Bjornstad, Douglass E. Lyons, W. Scott Cilento, Tommy G. Purer, and Connie J. Stallings. The Silver Snoopy Award was created by the astronauts to honor people who contribute most to the safety and success of human spaceflight. The award is presented to no more than 1 percent of the Space Center's work force each year. Recipients are given a silver pin depicting the famous beagle wearing a spacesuit. All the pins have flown on previous shuttle missions. [Florida Today, Feb 2, 1997, p 7E.]

NASA NAMES ACTING SPACE STATION DIRECTOR

Gretchen W. McClain will be the acting director of space station requirements at NASA's Washington, D. C., headquarters, said Wilber Trafton, associate administrator for spaceflight. McClain replaces Lt. Col. Andrew Allen, who is retiring from the Marine Corps. He had served as director of space station requirements since 1996. Before her appointment, McClain served as chief of the space station, headquarters office. [Florida Today, Feb 2, 1997, p 7E.]

February 3:

FINAL PROCESSING

On Monday, Feb. 3, KSC completed the final processing of those civil service employees who elected to accept the NASA buy-out. Since the buy-out was approved in November 1996, 218 KSC employees submitted applications. Of these, 168 employees actually left the center's rolls. While smaller numbers of employees left on several different dates, the largest group of 76 employees left on Jan. 3. An additional 38 employees left on Feb. 3, the final day of the buy-out. In all, there were 127 retirements and 41 resignations from Nov. 30, 1996 to Feb. 3. [KSC Countdown, Feb. 6, 1997.]

KENNEDY SPACE CENTER IS STAR-STRUCK

More than 2,000 extra workers crowded around Kennedy Space Center this weekend for a special job, the biggest of its kind here. But it was to film a movie, not to launch a rocket. Entertainment is so important to the Florida space industry that state and private officials will conduct a special seminar Tuesday in Cocoa Beach to discuss how to lure more Hollywood and tourist-oriented projects to KSC. In 1996, 27 different entertainment companies came to KSC, producing more than 35 programs or films. "There is a huge interest [in space movies]. There always is because space has a mystique for everybody when you're asking about your place in the universe," movie producer Steve Starkey said. "I don't understand what the relationship is between renewed interest in cinema and a lack of interest in Washington." Starkey wrapped up local filming Saturday of the movie *Contact* starring Jodie Foster. He brought in 150 crew members, three helicopters and scores of television trucks for nearly a week of filming at KSC. Based on Carl Sagan's novel, the movie's plot brings the world's top scientists to KSC for a mission toward an alien race. "The politicians are out of touch with the public," said John Pike, space policy director for the American Federation of Scientists, a think-tank. With all the cutbacks in the real work at Kennedy, Pike said he worries tourists will be looking only at space history not at the future. The new Apollo/Saturn V museum that opened in December drew record crowds of more than 13,000 a day to tour KSC, is only about history.

Playing up space as entertainment could eventually help increase funding in Washington, Pike said. And that's what KSC Director Jay Honeycutt said he had in mind when he decided to make it easier to film at Kennedy. "The fact that Hollywood and the entertainment industry has seen the wisdom of doing shows on space and the space program is a wonderful thing for us," Honeycutt said while visiting the set of *Contact*. "My objective is to open it up to as many people as are interested." KSC is becoming increasingly familiar to Hollywood, especially since the success of the movie *Apollo 13*, said Space Coast Film Commissioner Bonnie King. But no matter how much NASA courts the public and Hollywood, the space agency will not launch a shuttle just for a movie, Honeycutt said, adding: "Unless they want to pay for it. If they want to pay for it we'd be glad to do it."

Here are some of the higher-profile projects at Kennedy Space Center. *The Cape*. Eleven episodes of the syndicated TV show. *Contact*. A major movie based on Carl Sagan's book. *Bright Angels Falling*. A major movie about an approaching comet. *From Earth to the Moon*. An HBO docudrama series on the Apollo program. *Bill Nye the Science Guy*. A PBS and Disney children's science TV show. Discovery Channel. The cable network shot three specials. An IMAX movie on the shuttle-Mir missions. *Pioneer*. The science television show shot three specials. *Sightings*. A syndicated TV show on unusual occurrences. Radio Aahs. The children's radio network broadcast a show from KSC. [The Orlando Sentinel, Feb 3, 1997, p A-1 & A-5.]

February 4:

ASTRONAUTS SPEAK AT VISITOR CENTER

The five astronauts who flew an 18-day mission aboard shuttle Columbia in November will tell visitors about their record-setting journey at the Kennedy Space Center Visitor Center. The mission, STS-80, the longest shuttle flight to date, involved the release and retrieval of two scientific satellites. The crew is made up of astronauts Ken Cockrell, Kent Rominger, Story Musgrave, Tammy Jernigan and Tom Jones. [**Florida Today**, Feb 2, 1997, p 1E.]

TWO PROBES INCH WAY TOWARD MARS

Three months after launch, two NASA probes on their way to explore Mars are in excellent shape and on target for the Red Planet. Agency officials said Tuesday one of the spacecraft - Mars Pathfinder - fired its steering thrusters Monday evening, moving it on a path to drop a small rover July 4 on an ancient Martian flood plain. Pathfinder will make two more firings in the coming months to perfect its course. The rover, called Sojourner, will scout for signs of life. The other probe - Mars Global Surveyor - is scheduled to arrive at Mars in September and begin orbiting the planet to map its terrain. Scientists say both probes are operating in near-perfect form as they continue their trek. Surveyor is about 12.5 million miles from Earth, while Pathfinder is about 11.5 million miles from home. [**Florida Today**, Feb 5, 1997, p 8A.]

February 6:

MORE DELAYS HIT TITAN 4 ROCKET

The Air Force announced more delays Wednesday for an already delay-prone Titan 4 rocket. Officials said the rocket will not leave its launch pad at Cape Canaveral Air Station until the end of the month because workers have fallen behind on routine flight preparations. The launch was originally set for Saturday. The military won't have a new launch date until next week. The rocket is to carry a new missile-detection satellite into orbit. [**Florida Today**, Feb 6, 1997, p 2A.]

BOOSTER REPAIR WORK BODES WELL FOR ON-TIME SHUTTLE LAUNCH

NASA has finished some repair work on shuttle Discovery's solid booster rockets, keeping the ship on track for a Feb. 11 launch to service the Hubble Space Telescope. Technicians changed nozzle plugs on both the shuttle's boosters as a precaution against a problem found during two launches last year. The work wrapped up Sunday, allowing Kennedy Space Center technicians to get in gear this week for the final preparations leading up to launch. [**Florida Today**, Feb 4, 1997, p 6A.]

NASA MAKES DO ON SLIMMER BUDGET

Despite a small spending slip, NASA will have a stable budget in fiscal year 1998 and

annually into the next century that should ensure it can carry out ambitious space exploration plans. That was the message Thursday from the Clinton administration, which said it wants to trim NASA's budget next year by \$200 million, a cut NASA Administrator Dan Goldin says the agency can accommodate. The president's budget request sets NASA funding at \$13.5 billion for fiscal 1998; \$13.4 billion for fiscal 1999, and \$13.2 billion for fiscal 2000 through 2002. KSC's budget:

	<u>1997 actual</u>	<u>1998 request</u>
KSC Total budget	\$1.189 million	\$1.176 million
KSC human space flight	\$ 921,100	\$ 904,300
KSC science, aeronautics and technology	\$ 29,439	\$ 31,430
KSC mission support	\$ 239,450	\$ 240,600
KSC distribution of work years	2,036 work years	1,824 work years
KSC construction project; upgrade utility annex chilled water plant	0	\$5.9 million

The NASA budget now goes to Congress, where appropriations committees in the House and Senate will begin the give-and-take process of shaping annual spending legislation. NASA's most visible missions - the space shuttle and the planned start of construction late this year of an international space station - would each receive slightly less than the current year. The shuttle would get \$2.97 billion, down from \$3.15 billion. The space station would get \$2.12 billion, down from \$2.14 billion. [Florida Today, Feb 7, 1997, p 1A-2A.]

SPACEHAB AGREES TO BUY ASTROTECH

The company that makes modules that fit into NASA's space shuttles for scientific experiments said Thursday it will buy another firm that prepares commercial satellites for launch. Spacehab Inc., which does its shuttle module work at Port Canaveral, said its purchase of Astrotech Space Operations LP from Northrop Grumman Corp. will help broaden its shuttle-centered business. Astrotech has facilities in Titusville and at Vandenberg Air Force Base in California. The terms of the deal were not disclosed. [Florida Today, Feb 7, 1997, p 10C.]

February 7: KSC STILL WORTH BIG BUNDLE TO FLA. ECONOMY

Despite an unprecedented restructuring and deepening job cuts, Kennedy Space Center still is worth \$1.14 billion to the state's economy. That's the amount that employment and contracts at KSC contributed to Florida's economic landscape during the 1996 budget year that ended Sept. 30, according to NASA figures released Friday. More than 98 percent of that amount - about \$993 million - was spent in Brevard County, which continues to make KSC a critical part of the area economy, despite its downsizing. [Florida Today, Feb 8, 1997, p 1A.]

February 8:

READY TO MAKE A SERVICE CALL

NASA is set to start the countdown today for its 82nd space shuttle flight with the aim of launching the spaceship Discovery on Tuesday to service the Hubble Space Telescope. Discovery and its seven astronauts are scheduled to lift off from Kennedy Space Center during a launch window that will open at 3:56 a.m. and close at 5:01 a.m. Launch preparations ran into a minor snag Friday (Feb 7) when a pair of vent doors in the shuttle's rear engine compartment failed three of 13 prelaunch tests. The doors, which open to equalize pressure with the compartment during launch, did not respond properly to computer commands during the failed tests. Engineers think the problem stems from a power drive unit used to open and shut the doors. The unit probably will be replaced, but NASA officials said the extra work would not delay Discovery's scheduled launch. The launch will be the second of eight planned shuttle flights this year. Liftoff Tuesday would lead to a planned Feb. 21 landing at KSC's three-mile shuttle runway. [Florida Today, Feb 8, 1997, p 2B.]

NATIONAL SPACE CLUB HONORS PIONEERS

Three space pioneers were recognized Friday with Lifetime Achievement Awards for their contributions to the nation's space program. Those recognized by the National Space Club's Florida Committee were: Peter Hoffman-Heyden, considered to be the "Father of Modern Radar;" G. Merritt Preston, director of the first space shuttle program office at Kennedy Space Center; George L. English, former director of KSC's executive management office. [Florida Today, Feb 8, 1997, p 2B.]

February 9:

KSC PROMOTES NEW DIRECTORS

Warren J. Wiley has been named deputy director of engineering development at Kennedy Space Center. In his new position as one of KSC's senior executives, Wiley will be responsible for assisting in the planning, development, design, acquisition, sustaining engineering, modification and rehabilitation of all KSC facilities, systems and equipment. In addition, he will serve as the KSC focal point for the X-33 and X-34 programs. This will include responsibility for developing infrastructure for launch and landing facilities at KSC.

Sterling W. Walker has been named director of engineering development at KSC. In his new position, Walker will be responsible for the planning, design, acquisition, sustaining engineering, modification and rehabilitation of all KSC facilities, systems and equipment.

Charles B. Mars has been named director of the ISO project office at KSC. Mars will be responsible for managing KSC preparations for ISO third-party certification. ISO is a series of quality standards that have been adopted by more than 80 nations. The ISO program describes the requirements of an effective quality system that space

center organizations will have to develop. [Florida Today, Feb 9, 1997, p 5E.]

RODDENBERRY, LEARY BLAZE NEW TRAILS IN SPACE

The ashes of two pioneers, "Star Trek" creator Gene Roddenberry and LSD guru Timothy Leary, loaded on a rocket strapped to a jet's wing, began the first leg of an unprecedented journey Sunday. The plane left California for Madrid, Spain, and will launch the ashes into space over the Canary Islands next month. Their remains were among those of 24 people, packed in lipstick-sized capsules and loaded into a metal canister by the newly formed Houston-based Celestis Inc. The other include space physicist Gerard O'Neill, rocket scientist Krafft Ehricke and a 4-year-old Japanese boy. The plane was to land at the Torrejon Air Base in Madrid, Spain, where the rocket was to be loaded with its primary cargo -- a commercial satellite. The capsules will orbit from 18 months to 10 years before re-entering the atmosphere to burn up like shooting stars. [Florida Today, Feb 10, 1997, p 2A.]

February 10: HBO DOCKS IN ORLANDO TO LAUNCH APOLLO SERIES

It's a step forward for HBO and a potentially giant leap for Central Florida's film industry. Production begins this week on *From the Earth to the Moon*, a \$50 million cable TV show about the Apollo space program. The anthology series, which boasts Academy Award-winner Tom Hanks as executive producer, will be filming for the next nine months at Disney-MGM Studios, Kennedy Space Center and Central Florida sites. Local industry observers consider the production the area's most glamorous project ever. It is estimated to pump \$30 million to \$35 million into the local economy and provide about 80 jobs and valuable Hollywood visibility. The series is based partly on Andrew Chaikin's book *A Man on the Moon*, which chronicles the voyages of the astronauts on the 12 manned Apollo missions. Chaikin is a consultant on the project, which is scheduled to debut on the premium cable network in December -- the 25th anniversary of the completion of the Apollo program. The first show to be filmed -- about the Apollo 11 moon mission -- will be the seventh to air. Shooting at KSC is expected to begin near the end of the month. [The Orlando Sentinel, Feb 10, 1997, p A-1 & A-4.]

SNAGS NOT EXPECTED TO DELAY DISCOVERY

With the space shuttle Discovery countdown down toward a 3:55 .m. Tuesday launch, NASA officials think they can overcome to minor problems with a fuel cell and the possibility of lingering clouds. Now if they can only overcome the Steve Hawley factor. Astronaut Hawley's job is to use the shuttle's 50-foot robot arm to pluck the Hubble Space Telescope out of orbit and put it in the payload bay, where other astronauts can upgrade the \$1.6 billion instrument. Hawley, a 45-year-old astronomer, used the arm to put Hubble into orbit seven years ago. But Hawley has trouble getting into orbit himself. He is the astronaut with the most shuttle launch delays.

One three previous flights, Hawley has had 10 launch delays. And that reputation dogs him within NASA. When Hawley went into management at NASA, he would arrive at Kennedy Space Center's launch control center for a liftoff, and KSC workers would make him put a paper bag over his head. They didn't want the shuttle to see him. When Discovery's crew arrived at KSC on Friday, some workers at the landing strip wore paper bags, said shuttle operations director Bob Sieck. There are two technical issues that could delay Discovery's launch, but Sieck said that is unlikely. Both concern fuel cells that make electricity to run the shuttle and produce drinking water. The chance of weather grounding Discovery is 30 percent, meteorologists said. Today's clouds and rain should clear by early Tuesday, they said. **[The Orlando Sentinel, Feb 10, 1997, p A-5.]**

NASA VETERAN TAKES GOOD CARE OF ASTRONAUTS

The functions of the Astronaut Office at Kennedy Space Center are the responsibility of Delores Green, a 25-year NASA veteran who is manager. She sees that the quarters are spotless, the meals are prepared properly and the routines are adhered to. She started in a summer program with NASA and moved through various offices and directorates in the program; procurement, administration, the center director's office, labor relations, mechanical engineering and equal opportunity. Finally, in July 1995, she moved to the Astronaut office. "We do everything to support the prime crew," she explains, and adds that she never fails to marvel at just how unflappable her charges are. "It's amazing to watch them, when they come in here. They're so calm. They think they have a job to do, an everyday thing. Nothing bothers them." **[Florida Today, Feb 10, 1997, p 1B.]**

SHUTTLE ASTRONAUT, 61, QUIT NESA RATHER THAN BE GROUNDED

Veteran astronaut Story Musgrave, a six-time space flier who helped mastermind the first Hubble Space Telescope repair, said Monday he is leaving NASA after being told he would never fly in space again. NASA officials told the astronaut a year ago that a November 1996 space shuttle mission would be his last. The space agency told the 61-year-old astronaut last week the decision was final. His departure from NASA later this year will end a three-decade career with the space agency. Musgrave said although he would have jumped at the chance of flying again, he was not unhappy with the decision. "I'm upbeat about it. I accept it," he said. "I've had one heck of a time of it. I've been able to do this for 30 years." Musgrave turned down an offer of a desk job helping to train new shuttle crews, saying he wanted to pursue new projects. "There's five lifetimes of work out there that people want me to do with them," he said. "Space needs to get turned into art. It needs to be communicated. It needs to be expressed." Musgrave joined NASA in 1967 during the Apollo program, but it was 1983 before his first shuttle mission. In 1993, Musgrave led a team of astronauts who fixed the Hubble telescope's flaws. **[The Orlando Sentinel, Feb 11, 1997, p A-6.]**

February 11:

DISCOVERY MUST HOOK HUBBLE ON 1ST TRY

The STS-82 mission began when Discovery lifted off smoothly at 3:55 a.m. Tuesday with a 7-person crew headed for the Hubble Space Telescope 360 miles above the Earth. It's a tricky rendezvous. Because of Hubble's high orbit, the shuttle crew has only enough fuel to make 1 attempt at capturing the telescope. Discovery is set to catch Hubble at 2:50 a.m. Thursday. Just four days before Discovery's launch, as the GHRS (Goddard High Resolution Spectrograph) instrument was taking final images of Mars, one of its two redundant electrical systems had an amperage spike that automatically shut down the instrument. Although the redundant side could possibly maintain GHRS operations and primary side possibly revived, the malfunction was a serious event. Hubble managers believe they are lucky the malfunction occurred just days before the GHRS replacement. Early Friday, the first of four days of spacewalking, astronaut Steve Smith will remove the refrigerator-sized device. The new spectrograph will be 30 times more powerful than the old one, which was damaged by a sudden surge of electricity, officials said. Astronauts will add three new infrared cameras, allowing Hubble to peer farther into space than ever before. Commander Ken Bowersox will maneuver up to Hubble and then inch along as Discovery comes close. With Discovery 35 feet below Hubble, astronaut Steve Hawley, who released the telescope into orbit nearly seven years ago, will use the space shuttle's 50-foot robot arm to snare Hubble by its handles. Hawley will lower Hubble into the shuttle's cargo bay and then onto a moveable support holder. Two teams of astronauts will spend four days working on Hubble. If everything goes as planned they will release the telescope early next Tuesday. After launch, one 136-ft.-dia. solid rocket booster recovery parachute sank off Cape Canaveral before it could be retrieved. Each booster uses three chutes. With the launch, 13 people are orbiting Earth: seven on Discovery and six on the Russian space station Mir. That ties a record set in 1995. Unless an extra backup EVA is required, Hubble is to be released by early Feb. 18, followed by Discovery's landing back at Kennedy, scheduled for Feb. 21. [The Orlando Sentinel, Feb 12, 1997, p A-1&A-11. Aviation Week & Space Technology, Feb 17, 1997, p 53-55.]

February 12:

RUSSIA HAS 2 WEEKS TO FINANCE SPACE MODULE

Russia, eight months behind schedule in building a key element of the International Space Station, has until Feb. 28 to provide money for the project or the United States will make other plans, NASA officials said Wednesday. NASA administrator Daniel Goldin told a congressional committee that Russia has repeatedly failed to keep its promises of financing and building a space station service module. Under the International Space Station agreement, Russia was to build and finance a module that would provide guidance, navigation, crew quarters and orbital control for the station. the service module is the third element of the station and is to be launched in April 1998. Work on the service module has stopped because the Russian government has failed to pay contractors who are building the hardware. [The Orlando Sentinel, Feb

February 13: MAJOR HUBBLE UPGRADES HANG IN BALANCE

The shuttle Mission 82 flight to install major new instruments and other hardware on Hubble is the second servicing flight to the telescope -- and just like the first in 1993, it is one of the more difficult shuttle missions ever flown. The shuttle crew retrieved Hubble at 3:33 a.m. EST Feb. 13. The complex servicing work was to get underway about 20 hr. after astronaut Steve Hawley used the shuttle's arm to grapple the 24, 500-lb. observatory as the two spacecraft flew 35 ft. apart at 17,500 mph off the southwest coast of Mexico. The capture of the telescope took place at 320-naut. mi. altitude in darkness with the scene illuminated by the orbiter's payload bay lights. Astronauts Mark Lee and Steve Smith left the shuttle at 11:34 p.m. Thursday, undertaking the biggest task of the mission to replace two of Hubble's most important pieces of scientific gear with improved versions. The crew had been trying to get started an hour early, but their preparations were stalled about 10 p.m., when one of the telescope's solar arrays spun halfway around. NASA officials think the array was blown out of place by a whoosh of air released from the chamber where the spacesuit-clad astronauts exit the shuttle. The air is pumped out of the chamber when the astronauts depressurize the chamber so they can float outside. The four-story telescope was secured in the bay early Thursday after it was captured by the shuttle's robot arm. The spacewalkers were to remove two scientific instruments called spectrographs and replace them with an advanced spectrograph and a near-infrared camera. NASA officials were pleased Thursday that the telescope had fared well after traveling 1 billion miles around the planet. [Florida Today, Feb 14, 1997, p 2A. Aviation Week & Space Technology, Feb 17, 1997, p 53-54.]

February 14: HUBBLE VISION GETS A BOOST

The Hubble Space Telescope was outfitted Friday with a new set of eyes by shuttle Discovery astronauts Mark Lee and Steven Smith, who conducted a flawless spacewalk to install two improved scientific instruments. Astronauts Greg Harbough and Joe Tanner started the second of four planned spacewalks late Friday night. Their goal: install a new fine guidance sensor that will allow Hubble to better target stars, galaxies and black holes. They also were to plug in a new tape recorder so Hubble can better store reams of celestial data. Two more spacewalks are planned for early Sunday and early Monday. NASA is using a new type of spacesuit for astronauts servicing the Hubble. The suit has adjustable brackets and sizing rings so it can be resized in orbit. Covering the new suit is a white multilayered outer protective suit. The STS-82 mission astronauts will leave Hubble with 11 new components worth \$350 million in a tuneup that should keep it operating until the turn of the century. [Florida Today, Feb 15, 1997, p 1A&5A.]

MAJOR HONORED AFTER 30 YEARS

Almost 30 years after his death, the name of Air Force Maj. Robert H. Lawrence will be added to those of other astronauts on the Space Mirror memorial at Kennedy Space Center Visitor Center. The Astronauts Memorial Foundation board of directors voted unanimously Friday to include Lawrence -- a pilot many considered to be the first black astronaut -- on the memorial. Lawrence died Dec. 8, 1967, when the F-104 Starfighter in which he was flying during his training, crashed at Edwards Air Force Base, Calif. The decision came after Gen. Thomas S. Mooreman, the Air Force vice chief of staff, signed a letter last month that awarded Lawrence astronauts status. No date has been set for the placement of Lawrence's name on the black granite Space Mirror. [**Florida Today**, Feb 15, 1997, p 1A.]

ISO PROJECT OFFICE CHIEF

Effective immediately, Ms. Laura N. Gosper is designated as Chief of the ISO Project Office. This office will lead the Center efforts for all ISO certification and maintenance activities. Details of this will be included in an official revision to the Kennedy Organization Manual. [**Memoranda**, Honeycutt, Feb 14, 1997.]

February 15:

ASTRONAUTS AWARD SEVERAL SNOOPYS

Four local EG&G employees recently were presented with NASA's prestigious Silver Snoopy Award for their contributions to the space program. The awardees were Kevin Fresa, Rosemary Wright, Larry Jewell, and Steve McGovern. Two United Space Alliance employees have received Silver Snoopy awards, Dave VanDenBeldt and Harold Shackelford. Five EG&G Florida employees recently received Silver Snoopy awards for space program contributions. Doug Carraway, Bob Castlen, Huan Truong, Bob Browning and Richard Hall. Sherikon Space Systems employee Bob Burns also received the Silver Snoopy award. [**Florida Today**, Feb 16, 1997, p 5E.]

ASTRONAUTS FIND TEARS IN HUBBLE'S SKIN

Two spacewalking astronauts who installed souped-up guidance equipment on the telescope Saturday found something they didn't expect -- Hubble is showing extensive signs of old age. Astronauts Joe Tanner and Gregory Harbaugh reported that parts of its skin are torn and tattered, causing NASA officials Saturday to consider adding more repair work to the list of chores for its spacewalking Hubble team. Nonetheless, officials say the problems -- which include split insulation -- are not serious and in no way will hamper the operation of their astronomical champion. The successful work Saturday by Tanner and Harbaugh made NASA two-for-two in the Hubble spacewalk department as shuttle Discovery's astronauts continue their job of making \$350 million worth of improvements to the observatory. The tears were discovered by Tanner and Harbaugh as they sailed through more than seven hours of work to install a new fine

guidance sensor on Hubble. The \$8 million unit, which is the size and shape of a baby grand piano, allows Hubble to lock onto guide stars and pinpoint its targets. The astronauts then undertook two other chores by swapping out a science data recorder than had stopped working and installing a cable that controls a mirror on the new guidance sensor. It was while doing the installation work that the men spotted cracks on Hubble's skin that were 12 or more inches long, leaving flaps of material fluttering when the telescope was moved. The trouble spot is limited to a top sheet of multilayered covering that shields the telescope's instruments from extreme temperature swings as it travels in and out of the sun's warmth. Those temperature changes probably caused the tears by making the silver Teflon material expand and contract thousands of times during the telescope's almost seven years in orbit, officials said. Also Saturday, the shuttle side stepped a piece of space junk the size of a book by moving into a safer, higher orbit. The fragment of an exploded rocket would have come dangerously close to Discovery had the crew not steered out of the way. [Florida Today, Feb 16, 1997, p 1A & 2A. The Orlando Sentinel, Feb 16, 1997, p A-9.]

February 16:

JCSAT-4 LAUNCHED

Lockheed Martin placed a \$100-million Japanese communications satellite into a supersynchronous transfer orbit with the first of nine planned Atlas booster launches this year. The aerospace conglomerate's Atlas 2AS booster, designated AC-127, lifted off Pad 36B at 8:42 p.m., Feb. 16, with its JCSat-4 payload. The launch was delayed through most of the 84-min. window by low clouds and high upper-level winds that were responsible for the scrub of the first planned launch attempt the previous day. [Aviation Week & Space Technology, Feb. 24, 1997, p 25.]

HUBBLE REPAIR KIT MADE OF SPARE PARTS

In an improvised record-tying fifth spacewalk, astronauts tonight will try to patch the Hubble Space Telescope's peeling outer insulation to keep delicate instruments from getting burned by the sun. Space shuttle Discovery astronauts Mark Lee and Steve Smith will take spare insulation blankets and belt them over six ripped thermal coverings coating the \$1.6 billion telescope in an unscheduled four-hour spacewalk that should start about 11 p.m. The patches will cover about 14 square feet. Despite the hastily planned patch work, NASA managers said the telescope is not in immediate danger. But, they said, it's wise to make the repairs before the next Hubble tuneup in 1999. The impromptu repairs over shadowed the work Discovery's astronauts already have accomplished. In their first three spacewalks, they completed all of the goals NASA had set to consider it a successful mission. They have vastly improved Hubble's ability to see more of the universe and replaced 1970s technology with 1990s parts. Lee and Smith have replaced three balky internal parts of the telescope that help computers talk to each other, record science data and move Hubble around. [The Orlando Sentinel, Feb 17, 1997, p A-6.]

ASTRONAUT DESIGNATED FREE SPIRIT

Record-setting astronaut Shannon W. Lucid will receive The Freedom Forum's highest honor, the Free Spirit Award, tonight at a dinner in Satellite Beach. The Free Spirit Award is given periodically for extraordinary achievement to people who embody the principles of free spirit, free press or free speech. Lucid has flown five space shuttle missions. She set the U.S. endurance record of 75.2 million miles in 188 days, four hours and 14 seconds last year aboard shuttle Atlantis. She orbited on the Russian Space Station Mir after leaving Atlantis and returned to Earth Sept. 26. A \$25,000 contribution to the NASA College Scholarship Fund accompanies the award. The fund supports education for children of NASA employees. [Florida Today, Feb 17, 1997, p 1B.]

February 17: KSC CHEMICAL SPILL SENDS 8 TO INFIRMARY

A capful of toxic rocket propellant splashed on workers Monday at Kennedy Space Center, sending eight people to the KSC infirmary. Four technicians and four firefighters were treated at Kennedy's medical center and released, said NASA spokesman Bruce Buckingham. The accident is the second fuel leak at KSC in the past month. Technicians were replacing a valve on a fuel line that they thought was empty. However, a remnant of the fuel called monomethyldrazine splashed onto the workers, officials said. The fuel is used in shuttles' thrusters and can burn and be toxic if inhaled. The workers were wearing special face masks and gloves, but the chemical burned through one technician's clothing, causing superficial burns, said Bob Granath, spokesman for the United Space Alliance. There was no shuttle in the hangar where the incident occurred. The hangar and another nearby were evacuated, Granath said. Last month, another toxic fuel leaked at an occupied launch pad forcing dozens of people to evacuate. [The Orlando Sentinel, Feb 18, 1997, p A-5.]

February 18: ASTRONAUT CADY COLEMAN BEGINS TRAINING AS BACK-UP FOR STS-83

Astronaut Catherine "Cady" Coleman (Major, USAF) has begun training as a backup Mission Specialist to Donald Thomas, Ph.D., who suffered a broken right ankle on January 29 following the conclusion of a routine training exercise. "We are hopeful that Don will be cleared for flight," said David C. Leestma, director of Flight Crew Operations. "He is an experienced astronaut with the majority of his required training for this flight already complete. The decision to assign Cady as backup was made to protect all available options." Thomas continues to train with his crew mates to support the more than 25 microgravity science investigations that will be conducted on Columbia's 16-day flight targeted for an April 3 launch. His training as one of two astronauts who would perform any required contingency EVA was complete before the injury occurred. Coleman has begun refresher EVA training and familiarization with the science investigations to be conducted on STS-83. The STS-83 crew consists of

Commander Jim Halsell, Pilot Susan Still, Payload Commander Janice Voss, Mission Specialist Mike Gernhardt, and Payload Specialists Roger Crouch and Gregory Linteris. [NASA News Release #97-27, Feb 18, 1997.]

VACUUM INSULATION STUDY AGREEMENT
APPROVED BETWEEN KSC AND MVE, INC.

A Minnesota company and Kennedy Space Center (KSC) are teaming up for a comparative study of cryogenic vacuum insulation systems. MVE Inc., of New Prague, Minnesota and NASA-KSC have signed a nonreimbursable Space Act Agreement. KSC Director Jay F. Honeycutt and MVE Technology and Engineering Vice President Jon P. Wikstrom signed the Space Act Agreement on February 18, 1997. The agreement, in which no transfer of funds or other financial obligations are involved, is scheduled to conclude in November 1997. The agreement includes testing and evaluation of new materials for cryogenic insulation performance. [Technovation, Spring 1997, p 3.]

February 19:

HUBBLE MISSION SCRAMBLES
TO MAKE SURPRISE REPAIRS

Controllers at Goddard Space Flight Center this week are checking out the new "Mk. 2" version of the Hubble Space Telescope, which was deployed from the shuttle Discovery Feb. 19 with nearly a dozen new systems and six emergency bandages to repair critical insulation damaged by long-term space exposure. "We don't have the original Hubble Space Telescope any more, we've got a new telescope -- you can call it Hubble 2," said Edward Weiler, NASA HST project scientist. The already complex flight had major unexpected events. What started as a highly choreographed "servicing" mission to upgrade Hubble systems was forced to shift into an emergency "repair" mission requiring an unplanned fifth EVA. And for one critical moment the mission flirted with disaster when an unexpected blast of air from Discovery's air-lock struck one of Hubble's fragile solar arrays, pitching it violently. The event caused no apparent damage but could have seriously crippled the unique observatory. When shuttle Mission 82 pilots Navy Cdr. Kenneth Bowersox and USAF Lt. Col. Scott Horowitz rendezvoused with the telescope Feb. 13, the observatory was filled with 1970s era technology. But after five extravehicular activities (EVAs), Hubble is now equipped with 1990s instruments and other systems that should substantially boost its ability to explore the universe. [Aviation Week & Space Technology, Feb 24, 1997, p 20-23.]

DISCOVERY CREW DROPS HUBBLE INTO ORBIT

The STS-82 mission astronauts released the Hubble Space Telescope into orbit at 1:41 a.m. today, using the shuttle's robot arm to hoist it out of Discovery's cargo bay and drop it gently over the side 370 miles above Earth. From that point, the machine

many call one of the most remarkable of our time soon will be back at work hunting the elusive truths about the universe. The seven astronauts aboard Discovery, meanwhile, will have the next few days to relax as they cruise through the home stretch of their mission and head toward Friday's scheduled 1:48 a.m. landing at Kennedy Space Center. All told, the spacewalking teams of Joe Tanner, Greg Harbaugh, Mark Lee and Steve Smith moved more than 4,500 pounds of equipment in and out of Hubble using more than 200 tools to enhance its vision and performance. The most important work involved installing two new instruments to better allow Hubble to scan the heavens in search of black holes, distant galaxies, embryonic planets and baby stars. The final scorecard showed they performed five spacewalks and spent 33 hours outside their ship. [Florida Today, Feb 19, 1997, p 1A.]

USA PICKS NEW CEO

The private contractor taking over day-to-day shuttle fleet operations for NASA will have a new boss as of April 1, officials said Wednesday. Paul Smith, president of Boeing North American's Rocketdyne Division, will serve as president and chief executive officer of United Space Alliance, a joint venture partnership between Lockheed Martin and The Boeing Co. Smith replaces Kent Black, who is retiring. In his new post, Smith will be responsible for maintaining shuttle flight safety as the alliance gradually takes on launch work that for almost 40 years has been the responsibility of NASA. Smith has worked 32 years for Rockwell International, which sold its space-related divisions to The Boeing Co. in December. Boeing became part of the United Space Alliance joint venture as part of that deal. [Florida Today, Feb 20, 1997, p 12C.]

DELTA BLAST SPURS CHANGES

The Air Force and Brevard County are putting in place a new emergency broadcast system in wake of last month's Delta rocket explosion, which triggered alarm along the Space Coast. That was the word from Air Force officials Wednesday as they gave the public its first glimpse at an estimated \$50 million in damage at Cape Canaveral Air Station caused when the rocket erupted into a fireball. Investigators still are not sure what triggered the Jan. 17 explosion 20 seconds after liftoff, sending a plume of toxic rocket fuel toward the cities of Cape Canaveral, Cocoa Beach and parts of Merritt Island. Air Force investigators apparently are focusing on the possible failure of one of the Delta rocket's nine strap-on solid rocket boosters. But officials Wednesday declined to comment. "It's a very methodical process going through these investigations," said Air Force Col. Duane Deal, commander of the 21st Logistics Group at Peterson Air Force Base in Colorado. "We're going to keep on proceeding until we get all the answers that we can, but we may or may not come up with a cause." In the meantime, the Air Force and local officials are taking swift action to speed up the system by which the public is notified of possible danger in the event of a rocket or a NASA space shuttle explosion. The idea is to rapidly spread information

about possible toxic fallout from a launch failure, and tell people the actions they should take to avoid danger. "The definite lessons learned from the Delta accident had to do with communications," said Peter Taddie of the Range Safety Office at the Air Force's 45th Space Wing, which oversees launch operations at the Air Station. "Right after we had the accident, we had difficulty getting access to the phones, and also the communications between our control center and the county was jammed." To rectify the problems, the Air Force and Brevard Emergency Management officials are taking the following steps. First, a county emergency management official will be on hand in the Air Force Range Operations Control Center for all future launches of Deltas, Atlases, Titans and space shuttle. Secondly, The Air Force has installed direct audio and video communications lines from its control center to the Brevard Emergency Operations Center. Together, the two measures are expected to speed the dissemination of information. [Florida Today, Feb 20, 1997, p 1A & 2A.]

February 20: GLENN ORBITS THE EARTH 35 YEARS AGO TODAY

On this day, 35 years ago, Astronaut John H. Glenn, Jr. completed three historic orbital flights of the Earth in the Friendship 7 space capsule. [NASA Video Advisory #V97-12, Feb 20, 1997.]

LAST TASK FOR DISCOVERY CREW:
RARE NIGHTTIME LANDING AT KSC

With their work on the Hubble Space Telescope done, it's time for shuttle Discovery's crew to try something different -- a nighttime landing at Kennedy Space Center. That's what NASA has planned for the shuttle, which is scheduled to touchdown at the spaceport's swamp-lined runway at 1:48 a.m. Friday. Shuttle skipper Ken Bowersox will have a little extra help keeping Discovery on target during his approach: a string of 54 halogen lights in the center of the landing strip. With nighttime or near-dawn landings at KSC becoming more commonplace, the new safety light system was installed after requests from NASA's astronaut corps. For this night landing at Kennedy, NASA will have its usual super-powerful Xenon lights on flatbed trailers on both ends of the landing strip. Each light is 100,000 times brighter than lights used at Orlando International Airport. But this time, because pilots have complained that they lose the center line of the runway in this wash of bright lights, NASA installed 52 new lights down the middle of the strip. Each of those lights, spaced 200 feet apart, are 80-watt Halogen lights, a cross between headlights and lights in a living room. NASA planned to install these lights before the first shuttle launch in 1981 but couldn't get the lights to remain flat enough on the runway. Shuttles land at 220 mph, about 100 mph faster than airplanes, and any little bump could shred a tire. Now the space agency has gotten the lights so small that they only stick one-eighth of an inch above the runway. Discovery's planned landing will be only the ninth night touchdown in 82 shuttle flights, and the fourth in darkness at KSC. Discovery's landing will cap a 10-day mission to service Hubble. [Florida Today, Feb 20, 1997, p 2A. The Orlando

Sentinel, Feb 20, 1997, p A-11.]

GALILEO COMES WITHIN 360 MILES OF EUROPA

America's big Galileo spacecraft Thursday had its closest rendezvous with Europa, a Jupiter moon that scientists suspect may harbor an ocean's worth of water under its icy outer shell. On its way toward the rendezvous, and on its way out again, Galileo snapped photos, took gravity readings and collected other data, all aimed at sorting out Europa's history, assessing what's going on now, and seeking water, water anywhere. Galileo's closest approach, 360 miles above Europa's surface, occurred at 12:06 p.m. EST Thursday. The data it gathers will be radioed back to Earth gradually over the next few weeks. [Florida Today, Feb 21, 1997, p 6A.]

February 21:

CLOUDS DELAY SHUTTLE LANDING

A band of clouds over Kennedy Space Center early today forced NASA to forego its first opportunity to bring shuttle Discovery and its crew home. NASA scheduled a second landing attempt at 3:32 a.m. The ship and its crew of seven astronauts had planned to touch down at 1:48 a.m. in a rare nighttime landing at the spaceport. [Florida Today, Feb 21, 1997, p 1A.]

SCIENTISTS AWAIT IMPROVED HUBBLE IMAGES

The tuneup's done, but be sure to tune in again this May. That's when NASA will see the first fruits of the agency's Hubble Space Telescope servicing call, a spacewalking extravaganza capped early Friday with shuttle Discovery's moonlight landing at Kennedy Space Center. Now, antsy astronomers have to sit through 10 weeks of tests on Hubble's newly installed instruments, which promise to peer not only into stellar nurseries but to the veritable edge of the universe. Discovery's crew - which pulled off a record-tying five spacewalks - outfitted the observatory not only with two new science instruments but also a crucial guidance unit, data recorders, and improved electronics gear. The mission ended under a near-full moon at 3:32 a.m. as Discovery commander Ken Bowersox weaved the ship to a stop on a three-mile runway lighted by search lights and 52 new safety lamps in the center of the landing strip. Bowersox, a Navy commander with more than 300 aircraft carrier landings to his credit, touched down on the right side of the swamp-surrounded strip and then found the spaceship drifting further toward the runway's edge. The former test pilot said the diamondlike string of halogen lights - which were added at the request of the astronaut corps to make nighttime landings safer - helped him guide the shuttle back to the center of the runway. "That drift you saw there is exactly why you have those centerline lights," the veteran astronaut said. "I was really glad to have them there." With Discovery safely on the ground and Hubble in an orbit 385 miles above Earth, NASA's plan calls for ground engineers to put the observatory through a methodical series of tests. [Florida Today, Feb 22, 1997, p 1A&2A.]

ROCKET FUEL FROM DELTA BLAST WASHES ASHORE

Pieces of solid fuel propellant, from a Delta 2 rocket explosion last month, have started washing up on Cape Canaveral Air Station about 2 ½ miles north of the Port Canaveral inlet. The propellant -- which has the consistency of a pencil eraser -- is relatively inert and poses no real threat of bursting into flames or exploding. [**Florida Today**, Feb 22, 1997, p 1A.]

February 23:

SMALL FIRE EXTINGUISHED ON MIR

A problem with an oxygen-generating device on the Mir space station last night set off fire alarms and caused minor damage to some hardware on the station. No injuries to any of the six crewmembers on board were reported. The fire was located in the Kvant 1 module. The fire, which began at 10:35 p.m. Sunday, Moscow time, burned for about 90 seconds. The crew was exposed to heavy smoke for five to seven minutes and donned masks in response. After completing physical exams of everyone on board, U.S. astronaut Jerry Linenger, a physician, reported that all crewmembers are in good health. Medical personnel have directed them to wear goggles and masks until an analysis of the Mir atmosphere has been completed. Lithium perchlorate candles are burned to generate supplemental oxygen when more than three people are on board the space station. The oxygen-generating candles usually burn for five to 20 minutes. Russian officials believe the problem began when a crack in the oxygen generator's shell allowed the contents of the cartridge to leak into the hardware in which it was located. Crewmembers extinguished the fire with foam from three fire extinguishers, each containing two liters of a water-based liquid. The damage to some of Mir's hardware resulted from excessive heat rather than from open flame. It is reported by Russian flight controllers that all Mir systems continue to operate normally. In addition to Linenger, the Mir crewmembers include Mir 22 cosmonauts Valery Korzun and Alexander Kaleri, Mir 23 cosmonauts Vasily Tsibliev and Alexander Lazutkin, and German researcher Reinhold Ewald, representing the German space agency, DARA. [NASA News Release #97-30, Feb. 24, 1997.]

SPACE STATION FREEZER ON ORDER

Satellite producer Matra Marconi Space will develop four low-temperature freezers to be used on NASA's planned international space station, a \$40 billion outpost to be raised in orbit between November and June 2002. Designed to maintain a temperature of minus 176 degrees Fahrenheit, the freezers will be used to stock experiment samples in a U.S. built station laboratory module. Three flight models of the freezer are to be delivered to NASA between 1999 and 2000. A fourth is to be delivered to the Japanese Space Agency in 1999. [**Florida Today**, Feb 23, 1997, p 6E.]

February 24:

USAF TEAM PROBES DELTA MOTOR FAILURE

U.S. Air Force investigators have determined that the failure of an Alliant Techsystems solid rocket motor caused the accident that destroyed a Delta 2 and its \$40 million navigation satellite payload last month. USAF investigators have concluded that the No. 2 motor, one of nine Alliant Techsystems boosters on the Delta 2 (and one of six firing at the time), began to fail within seconds of the vehicle's launch from Cape Canaveral's Pad 17A on Jan. 17, according to officials close to the investigation. The first next-generation spacecraft of the Air Force's Global Positioning System satellite system was lost in that accident. [Aviation Week & Space Technology, Feb. 24, 1997, p 24-25.]

U.S. - RUSSIAN SPACE UNION MAY BE ON THE ROCKS

When Russia signed up to help build the international space station, the Clinton administration hailed the partnership as a triumphant union of post-Cold War foreign and space policies. Less than four years later, the marriage with Moscow may be headed for a Capitol Hill divorce. Russia's participation was supposed to lower the cost and speed delivery of the \$40 billion outpost, which is to be a permanently staffed science institute in low Earth orbit. It hasn't worked out that way. One reason is Russia cannot meet a deadline to deliver an essential space station component called the Service Module. That, combined with other failures and delays, has thrown the project into a state of "technical confusion," according to a recent report from Congressional Research Service. As a result, NASA Administrator Dan Goldin recently acknowledged before a congressional committee that the planned November launch of the first piece of space station hardware might be delayed. If that happens, construction of the outpost could be pushed back six months or longer, agency officials say. Goldin said the Russian government has until the end of this week to make good on its promises regarding the tardy module, or NASA will shift to an alternate plan. Three Republican congressmen who serve on the House Science Committee went to Moscow last week to assess where Russia stands on its obligations. "I support building the international space station, with or without the Russians," said Rep. James Sensenbrenner R-Wis., chairman of the Science Committee. NASA estimated the Russian contribution to the station would save U.S. taxpayers \$2 billion and allow completion of the project a year earlier. Without the Russians, NASA could be forced to ask Congress for more time and money -- a chancy prospect. [Florida Today, Feb 24, 1997, p 1A&2A.]

TITAN LIFTS SATELLITE INTO ORBIT

A new version of the world's most powerful unmanned rocket lofted a missile warning satellite toward orbit on its maiden voyage Sunday, clearing the way for a \$3 billion NASA mission to Saturn later this year. The 17-story Air Force Titan 4B rocket vaulted off launch complex 40 at Cape Canaveral Air Station at 3:20 p.m., flying

through thick clouds as it arced out over the Atlantic Ocean toward orbit. The launch marked the culmination of a decade-long \$950 million development program and also paved the way for the Air Force's next Titan 4B flight: the Oct. 6 launch of NASA's Cassini spacecraft to Saturn. The rocket is 25 times more powerful than the Titan 4A rocket it is designed to replace. The Titan 4B rockets are capable of launching satellites weighing as much as 12,700 pounds into orbits 22,300 miles above the Earth, which is the operational realm of most communications satellites. [Florida Today, Feb 24, 1997, p 2A.]

February 24:

**RUSSIA HAS ANOTHER SPACE STATION
DELAY TO WORRY NASA**

Just nine months shy of becoming a reality, NASA's 13-year dream of launching an international space station may have to wait until next year. In another blow to NASA's so-close, yet so-far, \$43 billion planned space station, Russia's space chief blurted out Monday that the first part of the station will not be launched from Russia in November, a long-held NASA goal. That \$210 million first module -- which provides early propulsion, power and communications to the station -- won't launch until June 1998, Russian Space Agency Director Yuri Koptev said in a Moscow news conference. The problem is not with the American-financed module, which is already built, but with delays on a more critical third segment that Russia is 7 to 14 months behind on. That segment is needed to keep the first module -- and a second one nearly completed by the United States -- in a sustained orbit. If the third section is launched too late after the first two are put into orbit, the two could fall back to Earth and burn up in the atmosphere. The third segment, called a service module, is being built by the Russians and was to have been ready for launch in April 1998. But Russia is not paying its contractors, delaying the service module by up to 14 months. NASA has kept congressional support for the program on track the past four years. But the agency has been extremely sensitive to the political damage that can be done by talk of further delays. [The Orlando Sentinel, Feb 25, 1997, p A-1&A-4.]

February 25:

CONDITIONS BACK TO NORMAL ON MIR AFTER FIRE

Astronaut Jerry Linenger and his comrades aboard the Russian space station Mir dove back into their experiments Tuesday, two days after their work was halted by a small fire. The station residents -- which include Linenger, four cosmonauts and a German researcher -- were told Tuesday it was safe to remove the goggles and surgical masks they had been wearing. "The atmosphere is clear, the crew's in good shape and they've resumed science work," NASA spokesman Rob Navias said. The small blaze erupted Sunday in the station's Kvant 1 module, sending black smoke billowing throughout Mir's six trailer-sized rooms before it was doused. NASA officials don't know where Linenger was when the fire started, but the astronaut and physician later examined all the crew members and found them to be fine. [Florida Today, Feb 26, 1997, p 3A.]

February 27: STATION WORK DELAYS WON'T STALL SHUTTLE

NASA still intends to launch about seven shuttles annually the next two years despite a likely six to eight-month delay in construction of the international space station, a senior agency official said Thursday. The seemingly inevitable postponement of flights for the \$40 billion station project, however, is prompting NASA planners to juggle the agency's shuttle schedule. "Is it causing us some extra work? Yes," said Steve Oswald, NASA's director of shuttle program requirements. "In terms of rescheduling and replanning some stuff. Does it scramble (the shuttle schedule) and put it into disarray? No." Oswald said plans for 1998 call for seven flights, including two missions to Russia's space station Mir, a space science flight and launch of an advanced X-ray astronomy observatory. The station construction mission scheduled for launch Dec. 4 likely would be pushed back to July 1998. Two more station assembly flights then would follow before the end of that year. The 1999 shuttle schedule probably would include seven station construction flights and another mission to service the Hubble Space Telescope. [Florida Today, Feb 28, 1997, p 1A.]

February 28: NASA EXTENDS GALILEO'S MISSION 2 MORE YEARS

NASA's Galileo probe will be touring the moons of Jupiter an extra two years, thanks to a recent agency decision to extend its mission into 1999, officials say. The spacecraft was expected to wrap up its work in December, but officials at NASA's Jet Propulsion Laboratory in California have gotten approval for 10 more flybys of three tantalizing Jovian moons: Europa, Callisto and Io. The Io tour is to be Galileo's grand finale before its work is done in December 1999. [Florida Today, Feb 28, 1997, p 8A.]

ORGANIZATIONAL REASSIGNMENT

Effective immediately, Warren I. Wiley is assigned the duties of Acting Director, Mechanical Engineering and Acting Director, Electronic Engineering in the Engineering Development Directorate. He will assume these responsibilities in addition to his current assignment of Deputy Director of Engineering Development. [Memoranda, Honeycutt, Feb 28, 1997.]

JAY HONEYCUTT BIDS FAREWELL TO KSC

Jay Honeycutt says he loved almost every minute of his job as Kennedy Space Center's director, a post he left Friday (February 28) to pursue a career in private industry. "I'm leaving federal service just because it's my time to," said Honeycutt, who has worked 37 years for the government. "It's time to go try something different. But I think without a doubt being director of the Kennedy Space Center is the coolest job on the face of the Earth. I've enjoyed my watch." His two-year tenure at KSC's helm included overseeing the start of major changes, such as the reduction of the work

force to meet budget cuts and the unprecedented transition of shuttle management from NASA to a private company. Although some critics worry the restructuring could put shuttle safety at risk, Honeycutt sees no danger. "I think that in the long run all these changes that we're making will be for the better of NASA, KSC and the shuttle program," Honeycutt said. Honeycutt, 59, is to be replaced Monday by KSC's seventh director, retired Air Force Gen. Roy Bridges. He is a former astronaut who served as commander of the 45th Space Wing at Patrick Air Force Base in 1989 and 1990. That means Honeycutt, who has no job plans now, will watch the next shuttle launch as an outsider for the first time. Columbia is next up with a planned April 3 liftoff. Nevertheless, Honeycutt thinks it unlikely that retiring from NASA will make the launch any easier on him. The minutes surrounding the start of a shuttle flight always were tough on him. He said he never felt good until 8 ½ minutes after liftoff, when the shuttle's engines stop firing and it is safely in orbit. "That is not a fun time for me. From about T-minus 2 (minutes) to T-plus 8 ½ (minutes), you'll almost give (the job) to anyone who would take it," Honeycutt said. His easygoing manner and openness made Honeycutt popular among the KSC work force. For that and many other reasons, his colleagues say he will be missed. "He fit right in whenever he got here, and he stayed in that capacity even though he ended up with the top job as Kennedy Space Center director," said Bob Sieck, KSC's director of shuttle operations. "Everybody looked at him as 'He's still one of us.'" A racing fan and avid golfer, Honeycutt was easy to work with yet intently serious about the importance of his job, Sieck said. "He is calm, cool, collected and businesslike, and he expresses that in his approach to any kind of issue," he said. "So you bet he'll be missed." [Florida Today, March 1, 1997, p 2B.]

During February: SCHOOLS DID HOLIDAY SHOPPING AT KSC

NASA has been providing surplus government equipment at KSC to schools under the Stevenson-Wydler Act for several years, and computer systems always have been at the top of the lists. In recent months, approximately 1200 systems became available as a result of computer upgrades at the Space Center, and KSC got the word out to schools and received over 11,000 requests for computer systems. [The Brevard Technical Journal, Feb 1997, p 13.]

MARCH

March 1: UNVEILING OF NEW SPACE SHUTTLE MOCKUP

Kennedy Space Center will help launch the 1997 spring training season of the Florida Marlins baseball team with the unveiling of a new Space Shuttle mockup during opening day ceremonies. The event will take place on Saturday, Mar. 1 at 11:30 a.m. at Space Coast Stadium in Viera. The mockup is being donated by Kennedy Space Center to the stadium, home of the Florida Marlins spring training facilities and the Brevard County Manatees baseball team. Making the presentation to Space Coast Stadium will be KSC Director Jay Honeycutt. The mockup is 13 feet tall, 5 ½ feet wide, weighs approximately 350 pounds and is a high fidelity 1/15th scale model mounted on a conical pedestal. The orbiter is made from fiberglass and the external tank and solid rocket boosters are made from aluminum. The \$15,000 cost of the Space Shuttle mockup was covered by donations from Lockheed Martin Space Operations Company, Rockwell International, EG&G Florida, Delaware North Park Services of Spaceport, the NASA Exchange Council and the multi-contractor Joint Industry Press Center. [KSC Countdown, Feb. 27, 1997.]

March 2: PIONEER 10 SPACECRAFT NEARS 25TH ANNIVERSARY END OF MISSION

A major milestone for humanity's most distant and longest-lived interplanetary explorer will occur on March 2, 1997, when NASA's hardy Pioneer 10 spacecraft reaches its 25th anniversary in space. "Pioneer 10 exemplifies the American pioneering spirit of exploration far beyond the frontier," said Dr. Wesley T. Huntress, Jr., Associate Administrator for Space Science at NASA Headquarters, Washington, D C. "Not only has it made many major scientific discoveries in the far reaches of space, we're proud that it has managed to stay alive almost ten times longer than the original mission called for, a tribute to the designers and builders at TRW, and the operators at NASA's Ames Research Center. NASA operated the Pioneer 10 mission as long as it had enough power to return science data about the conditions in space as far from Earth as possible. We will end the science mission at the end of March because the power has finally become too weak to do significant science," Huntress said. Launched from Cape Kennedy on March 2, 1972, aboard an Atlas Centaur rocket for what had been planned as a two-year mission to Jupiter, Pioneer 10 is now so far away that its radio signal, traveling at the speed of light (186,000 miles per second), takes nine hours and ten minutes to reach the Earth. Currently twice as far from the Sun as Pluto, Pioneer is returning data about the farthest reaches of the Sun's atmosphere. Now 6.2 billion miles from Earth, the 570-lb. Pioneer 10, built by TRW Space and Electronics Group, Redondo Beach, CA, was the first spacecraft to travel through the asteroid belt and explore the outer solar system, the first spacecraft to visit Jupiter, the first to use a planet's gravity to change its course and to reach solar-system-escape velocity, and the first spacecraft to pass beyond the known planets. More information on Pioneer 10 is

available via the Internet at URL: <http://pyroeis.arc.nasa.gov/pioneer/PM10&11.html>
[NASA News Release #97-31, Feb. 27, 1997]

NASA GAMBLES ON AEROSPIKE ENGINE

The experimental engine NASA has selected to power the shuttle's intended replacement in the 21st century is based on the same concept NASA rejected for the space shuttle 25 years ago. "I saw the first linear aerospike engine...when we returned from the moon after April 16," former astronaut T. K. Mattingly said. "They took me out and poudly showed me this thing as the wave of the future, and I said, 'That's really neat.'" That was 1972. A design team rejected the aerospike concept as too risky. But today, with advances in design, lightweight structural materials, heat shielding and the like, "we're ready to take that next step," said Mattingly, now a Lockheed Martin Corp. vice president. Last summer, after a three-way competition, NASA selected a proposal from Lockheed Martin's Skunk Works to develop a 273,000-pound experimental prototype space place -- known as the X-33-powered by Rocketdyne linear aerospike engines. The objective of the new vehicle is to lower the cost of space transportation so dramatically that industry will replace government in building and operating launch vehicles, with the expectation of turning a profit. [Florida Today, March 2, 1997, p 6E.]

March 3:

MIR CREW SPENT THE NIGHT IN SOYUZ CAPSULES AFTER FIRE

The six-man Russian/U.S./German crew on the Mir orbital station was prepared to abandon Mir after a Feb. 23 fire filled the complex with "heavy smoke." The blaze, triggered when a lithium perchlorate "candle" used to boost atmospheric oxygen escaped its containment, was quickly doused with foam fire extinguishers. But the crew sealed off the Kvant-1 module where the blaze occurred and retreated to the two Soyuz capsules that brought them to orbit while Russian ground crews studied the situation and prepared emergency landing procedures. Even after the all-clear from the ground and a clean bill of health from U.S. astronaut/physician Jerry Linenger, the crew wore filtration masks around the clock for two days. It was the second time one of the oxygen candles, originally developed for use on submarines, triggered a fire on Mir. Valery Polyakov, who holds the record for long-duration space flight, smothered the first one on Oct. 15, 1994, with a crewmate's trousers. [Aerospace Daily, Mar 3, 1997, p 319.]

IBM FLASH CARDS LET SPACE SHUTTLE RECORD DATA WHEN GOING GETS ROUGH

The intense gravitational forces experienced inside a space shuttle during launch and the turbulence of landing have always spelled doom for traditional hard drives, which

rely on moving parts to record data. Now NASA is using IBM Corp.'s ATA Flash Storage Cards to record real-time data during mission critical stages of space expeditions, said Andrew Klausman, a mission manager with Lockheed Martin's Space Mission Systems and Services Division, the prime contractor for control and monitoring of space shuttle systems during missions. Until it began using the flash cards, NASA could not record positioning data from inside the shuttle during launch, Klausman said. "A traditional hard drive has to spin to record data," he said. The shock and vibration during certain phases of shuttle missions -- which sometimes experience gravitational pulls three times the Earth's -- prevent normal hard drives from operating. The flash card made its debut on a recent Atlantis shuttle mission, the STS-81, which ended on Jan. 22. The cards tested during the mission had 40M of electrically erasable, programmable read-only memory or EEPROM RAM. Shuttle astronauts used the cards, which have no moving parts, in their IBM ThinkPad 755C notebooks. The ThinkPads have been used for various tasks aboard the shuttle, including assisting the crew during rendezvous operations with the Russian Space Station Mir. Some notebooks also are used to monitor experiments. The flash card was able to conquer the gravitational forces with no interruptions in data flow, Klausman said. NASA will continue using the flash cards as its primary storage medium during the roughest parts of shuttle missions, Klausman said. [Government Computer News, March 3, 1997, p 14.]

FORMER CHALLENGER PILOT TO DRIVE KSC

Minutes after launch, one of the space shuttle's main engines had just quit. Pilot Roy D. Bridges Jr. was in a position no one had been in before. Switches had to be thrown, buttons found and pushed, following a new and intricate sequence of emergency procedures that at times had not even worked in simulations on the ground. Through it all Bridges remained calm, and even though he was a rookie, he "was on top of everything that was going on," his commander recalled. The 1985 mission aboard Challenger (STS 51-F) was the only time one of the shuttle's three main engines quit during the climb to orbit. The dangerous shutdown forced the shuttle into a lower orbit than planned. Nonetheless, the crew successfully finished the mission. Nearly 12 years later Bridges returns to Kennedy Space Center, this time as the director. The 53-year-old former Air Force general is arriving at a difficult time as the space agency continues to go through a restructuring that fundamentally is changing the way it operates. Jay Honeycutt, who retired Sunday as KSC director, was on the NASA selection board that picked Bridges to be an astronaut in 1980. "He's a very bright guy," Honeycutt said. "He's quiet, but he's personable. He gets along well with everybody." Honeycutt said the biggest challenge for Bridges is to maintain an orderly transition of the shuttle's operation. NASA is moving to more of an oversight roll with the shuttle as the private company United Space Alliance takes over the operation. [The Orlando Sentinel, March 3, 1997, p A-6. Florida Today, March 3, 1997, p 1A & 2A.]

March 4:

**SIX-MONTH SLIP SEEN IN FIRST FLIGHT
OF NEW SHUTTLE FUEL PUMP**

Continuing development problems with the advanced Space Shuttle Main Engine liquid hydrogen turbopump under development at Pratt & Whitney will delay first flight of the complete SSME Block 2 engine about six months, until the middle of next year, NASA and company officials say. Originally set for first flight late this year, the new fuel turbopump has developed cracks in its rotating machinery and housing that must be addressed first. Although Administrator Daniel S. Goldin has accused P&W of "snatching defeat from the jaws of victory" on the turbopump development, engineers involved in the project say such problems are always a risk on new rocket engine components. [Aerospace Daily, Mar 4, 1997, p 323.]

March 5:

**GOLDIN SENDING STAFFORD TO AUDIT
RUSSIA'S STATION SPENDING**

NASA Administrator Daniel S. Goldin is sending retired U. S. Air Force Lt. Gen. Thomas Stafford to Russia with a team of financial experts later this month to scrutinize Russia's spending on the International Space Station as part of an effort to plot a course for the project in the face of Russia's seeming inability to pay a partner's share of it. Goldin drew fire from members of the House Science Space and Aeronautics Subcommittee yesterday when he said he didn't know how much Russia plans to spend on Station after 1997. He said he has already started exploring possible barter arrangements to get the Russian Service Module built, trading U.S. cash for Russian minerals or other goods, but he conceded the totals involved are still obscure to NASA planners. Goldin told the panel that Stafford, who flew on the 1975 Apollo-Soyuz Test Project, will follow up on promises extracted in Russia by Rep. Dana Rohrabacher (R-Calif.) and other Science Committee members last month to gain access to Russia's Space Station books. [Aerospace Daily, Mar 5, 1997, p 331.]

MOVE OF COLUMBIA DELAYED

Tuesday's (March 4) planned move of Columbia from the OPF to the VAB was delayed as a result of problems encountered during close-outs of the 17-inch disconnect area on the orbiter. During close-outs, it was discovered that inserts had been stripped when screws used to secure the 17-inch disconnect umbilical flow liner were installed. All six inserts were replaced and close-outs were completed Tuesday evening. First motion occurred at 1:04 p.m. today. Once in the VAB, Columbia will be lifted to the vertical position and mated to the external tank and solid rocket boosters in the VAB high bay No. 1. The shuttle interface test will begin this weekend and roll out to Pad 39A remains set for Monday, March 10. [KSC Countdown, March 6, 1997.]

**March 6: NASA, USAF AGREE TO COORDINATE SPENDING
ON 'TIMELY' PROJECTS**

NASA and the U. S. Air Force Space Command have agreed to coordinate their spending on a variety of space-related efforts, including development of civil and military spaceplanes, measurements of the solar environment in near-Earth space, and use of launch and tracking facilities. Administrator Daniel S. Goldin and Gen. Howell M. Estes III, head of the Air Force Space Command, signed a memorandum of agreement last Friday setting up a "partnership council" that will meet at least twice a year for "proactive coordination in areas of mutual interest," according to the document. One area likely to get attention from the new panel is infrastructure like the space launch and tracking facilities at Cape Canaveral. "We share a common facility at Patrick AFB and Kennedy Space Center, the Space Command and NASA, so we want to make sure we're getting the most productive use out of those facilities," Goldin said. [Aerospace Daily, Mar 6, 1997, p 342.]

March 7: MIR CREW LOSES MAIN OXYGEN SOURCE

A generator that provides oxygen on Russia's Mir space station has failed, forcing the two Russians and one American on board to use a backup chemical system similar to one that sparked a fire two weeks ago, NASA said Friday. The Elektron device, which uses electricity to generate breathing oxygen from waste water, had been experiencing problems all week before failing Friday, spokesman Rob Navias said. An older, seldom-used backup system was activated but was shut down when it also malfunctioned. Russian flight controllers in Moscow reluctantly instructed the crew to start using chemicals that generate oxygen when heated. The chemical method is usually used to supplement the Elektron when there are more than three crew members aboard. Aboard the station are mission commander Vasily Tsibliev, flight engineer Alexander Lazutkin and U.S. astronaut Jerry Linenger. The U.S. space shuttle Atlantis is due to visit the Russian space outpost in May to pick up Linenger and drop off his replacement. [The Orlando Sentinel, March 8, 1997, p A-3.]

March 8: ATLAS 2A BOOSTER LAUNCHED

A Lockheed Martin/ILS Atlas 2A booster successfully launched the Space Systems/Loral Tempo direct broadcast satellite Mar. 8 from Cape Canaveral. The launch was delayed twice by technical problems and a third time by excessive winds at the launch site. Tempo is the most powerful direct broadcast satellite ever launched. [Aviation Week & Space Technology, March 17, 1997, p 23.]

March 9: IRISH GOLF MEMENTOS TO FLY ON SPACE SHUTTLE

The coats of arms of some of Ireland's best-known golf courses are to be carried into

space during a 16-day research mission to be launched in April aboard shuttle Columbia. When Columbia blasts off from Kennedy Space Center on April 3, its crew will carry along a pennant of the South West of Ireland Golf Co., courtesy of mission commander Jim Halsell, an astronaut of Irish descent. The pennant features the heraldic emblems of nine major championship golf courses, including Ballybunion. Columbia's seven-member crew also will carry a medallion featuring a 19th-century Irish emigrant ship, the Jeanie Johnston. It never lost a passenger in 16 voyages from Tralee to Baltimore, New York and Quebec during the Irish famine, when more than a million people left for new lives in the "New World." [Florida Today, March 9, 1997, p 5E.]

March 10: MIR LOSES PRIMARY OXYGEN-GENERATING SYSTEM

Russia's Mir orbital station has lost the primary and backup electrolysis units that produce crew oxygen from waste water, forcing the two Russians and one American aboard to rely on a supplemental system that is itself on backup because of a recent fire. A NASA spokesman at Johnson Space Center, Tex., said Friday the crew was in no immediate danger. After both electrolysis units malfunctioned and were shut down, the crew shifted to lithium perchlorate canisters designed to supplement crew oxygen when more than one three-person crew is aboard. [Aerospace Daily, Mar 10, 1997, p 359.]

ITALY WILL BUILD STATION NODES
IN BARTER DEALS WITH NASA, ESA

NASA has decided to proceed with a proposal by Italy to build two pressurized nodes for the International Space Station in a three-way barter deal that will give the European Space Agency a free ride to space for its Columbus laboratory module and will allow Italy to make up some of the industrial return deficit it has accumulated with ESA. Under the deal announced yesterday, Italy will deliver one node to NASA at the end of 1999 for launch early in 2000, and a second node two years later that will attach to the Station's habitation module and provide additional docking ports. In exchange for the two new nodes, a crew refrigerator/freezer unit for the lab module, a cryogenic freezer for the U.S. lab module, and other "minor hardware." NASA will launch the Columbus module aboard a Space Shuttle in a launch-offset arrangement. Such arrangements are in keeping with international cooperation principles developed for Station that give preference to barter over cash payments for services. [Aerospace Daily, Mar 11, 1997, p 363-364.]

'CAPE' GROUNDED AFTER 1ST SEASON

The syndicated television show "The Cape" has been scrubbed. Despite strong viewer support in the local market, MTM Productions confirmed Monday the show has not been renewed for a second season because nationwide ratings did not support the high

cost of production -- about \$1 million an episode. Bonnie King, Space Coast film commissioner, was disappointed with the news. The production pumped "a healthy \$18 million" into the Brevard County economy last year, King said. "We won't have that (this year), and it will really hurt us, so we have to hope we get something else." The program, starring Corbin Bernsen, is about the space program and the personal and professional lives of astronauts, astronaut candidates and NASA employees. It made its debut in Central Florida on Sept. 13. It was filmed at Kennedy Space Center and other Brevard locations, with technical guidance from veteran astronauts Buzz Aldrin and Bruce Melnick. [Florida Today, March 11, 1997, p 1D.]

March 11:

**SHUTTLE CREW IN TOW TO PRACTICE
FOR APRIL 3 LAUNCH**

Shuttle Columbia is resting on its launch pad today, but the spaceship is not sitting idle. It's ready to be put through its paces this week while seven astronauts are in town practicing for an April 3 launch of a 16-day research flight. Columbia was moved early Tuesday to its launch pad at KSC in preparation for NASA's third shuttle mission of the year. "We're on the pad, the crew's in town, and it's going to be a pretty busy week for us," KSC spokesman Bruce Buckingham said. "But we're on schedule and we're in good shape for April 3." During the mission, the shuttle is to serve as a gravity-free laboratory when the astronauts will conduct more than 25 experiments in the area of materials science, protein crystal growth and physics. Its crew is made up of Commander Jim Halsell, pilot Susan Still, mission specialists Michael Gernhardt and Donald Thomas, payload commander Janice Voss and payload specialists Roger Crouch and Greg Linteris. An eighth astronaut, Cady Coleman, is in town for the dress rehearsal as well. She has been training as a backup for Thomas, who broke his ankle in January during routine training. NASA officials in Houston say they expect Thomas to fly next month but Coleman is training just in case.

Meanwhile, officials have set April 24 as the launch date for the nation's newest weather satellite. The National Oceanic and Atmospheric Administration said Tuesday that GOES-K satellite will be launched from Cape Canaveral and go into a holding orbit to replace either of the two current stationary weather satellites. The GOES satellites orbit at the same rate the Earth turns, allowing them to remain above the same location on the planet, watching the weather as it changes. GOES stands for Geostationary Operational Environmental Satellite. [Florida Today, March 12, 1997, p 4A.]

**STS-83 SPACE SHUTTLE COLUMBIA
ROLLED OUT TO PAD 39A**

The 3.4 mile rollout of the space shuttle Columbia from the Vehicle Assembly Building to Pad 39A began at 6:30 a.m. on Tuesday, Mar. 11, and ended with the Shuttle hard down at 2:37 p.m. The entire complement of crawler transporter, MLP

and Shuttle weighs in excess of 18 million pounds. The transporter moves at an average rate of less than one mile-per-hour while carrying the Shuttle and uses a laser docking system to precisely position the MLP on the pad surface. A leveling system on the crawler transporter keeps the Shuttle stable during the rollout and during the climb up the 5 percent grade to the launch pad surface. Once at the pad, workers hot fired auxiliary power unit No. 2 early Wednesday (March 12) morning, and later placed the Rotating Service Structure around the vehicle. STS-83 will be the 22nd mission for NASA's first Space Shuttle orbiter. [KSC Countdown, March 13, 1997.]

**March 13: NASA SEEKS WAYS TO COMMERCIALIZE STATION,
OTHER LEO SPACEFLIGHT**

An internal NASA team has been "thinking out of the box" in an effort to find ways to commercialize human spaceflight in low Earth orbit, including the International Space Station, surveying consumer manufacturers for ideas and pondering a high risk, high payoff "space venture fund" to finance them. The goal from NASA's standpoint, said June W. Edwards, a NASA lawyer and a member of what is known as the Space Station Commercialization Team, is that 10 years after completion of the International Station, "we would simply say to the private sector 'here's our contract for utilization. Excuse us, we're going to Mars.'" Its name notwithstanding, the team is working on changing NASA's approach to commercializing LEO activities and is not restricted to Station. [Aerospace Daily, Mar 13, 1997, p 379.]

**SHUTTLE OPS SHIFT SAID GOING WELL,
BUT FUTURE PROBLEMS LOOM**

NASA is doing a good job of handing off day-to-day Space Shuttle operations to the United Space Alliance (USA) consortium, thanks in large part to the professionalism of the individual government and industry managers involved in the transition, but problems could develop when those managers retire, the head of an independent safety review panel told Congress yesterday. Paul M. Johnstone, chairman of the Aerospace Safety Advisory Panel, said the entire Shuttle program is plagued by an aging workforce, with the most junior technician on the shop floors at Kennedy Space Center typically at least a 10-year veteran of the program and senior managers nearing retirement age. Johnstone, whose panel of experienced outside experts is responsible for monitoring the safety of Shuttle and other NASA operations, gave generally high marks to the performance of NASA and USA in the first six months of the six-year Space Flight Operations Contract, which merged 12 contracts that were previously separate. But the panel found that goodwill at the top didn't always extend to the hands-on level, where contractor workers and NASA overseers didn't always share the "spirit of cooperation and good feelings" with their superiors, according to Johnstone's written testimony.

Stephen Oswald, deputy associate NASA administrator for space flight, told the

subcommittee that despite a cut of almost 1,000 NASA employees since 1994, the Shuttle safety record has improved. Astronaut crew are "three times as safe on ascent" as they were before the Shuttle restructuring started. Since 1993 in-flight anomalies have been cut more than 50%, from an average of 14.3 in 1993 to the current average of 6.75. In its first formal award fee review, NASA graded USA "very good," said Kent M. Black, outgoing USA chief executive. NASA and the consortium have started discussions for phase two of the Shuttle operations contract restructuring, which could bring another 16 separate contracts under the USA umbrella, he said.

Under questioning from subcommittee members Oswald said NASA is studying both the possibility of transferring Shuttle overhaul work from Palmdale, Calif., to KSC, and of canceling the Spacelab program after the planned STS-90 Neurolab mission in April 1998. Shifting overhaul to KSC, a move pushed by Rep. Dave Weldon (R-Fla.), who represents the KSC congressional district, might blur the focus on safe launches and create logistics problems at KSC, Oswald said. Dropping the Spacelab program managed at Marshall Space Flight Center in the Alabama congressional district represented by ranking subcommittee Democrat Rep. Bud Cramer would deprive NASA of an alternative to the privately owned Spacehab module, Oswald conceded. "But in reducing budgets, none of that's free, and most of it comes out of flexibility," Oswald said. [Aerospace Daily, Mar 14, 1997, p 391.]

NASA WILL RETURN TO MOON WITH PROSPECTOR

Twenty-five years after the last group of astronauts walked on its surface, the moon is going to get a new visitor -- but this one will stay for a year. A small spacecraft called Lunar Prospector is to head for the moon Sept. 24 aboard a Lockheed Martin rocket launched from Cape Canaveral Air Station. The just-completed spacecraft is undergoing preparations to be shipped here in August, where it will be readied for flight. Once in orbit around the moon, the craft is to search the lunar poles for water. It also will scan for minerals, map the moon's surface and chart its gravity and magnetic fields. Once launched, Prospector will need about five days to reach its target. Then it will settle into a polar orbit and circle the moon once every 118 minutes. [Florida Today, March 13, 1997, p 4A.]

SHUTTLE READY IF SPACE STATION DELAYED

Space shuttle managers said Thursday they are bracing for the first ripples in their flight schedule brought on by problems with the planned international space station. They just hope the ripples don't turn into waves of delays that could leave the 100-ton shuttle orbiters idle. Steve Oswald, the shuttle program director, told the House Space Subcommittee that his office is looking for ways to plug holes in the shuttle schedule should future station payloads not be available for launch. "We're actually planning on building some flexibility into the shuttle schedule," Oswald said. "The shuttle manifest is at some risk unless we have other payloads that we can throw in if there's

a delay in one of the [space station] payloads." He said NASA may let the Pentagon use the shuttle for follow-up to the Clementine lunar probe and for another defense mission using space radar to map the Earth's terrain. Those missions would come up in 1999 or 2000. At the moment, 27 shuttle flights are to be dedicated to ferrying station parts aloft between this December and June 2002, which the orbiting laboratory is to be completed. But cash-strapped Russia's delays in building key station parts likely means nothing will be launched until mid-1998. That throws off the first and second station-related shuttle flights -- penciled in for this December and for June 1998. But shuttle managers are more concerned about what happens after September 1998, when all but a few shuttle launches for the next four years are to be dedicated to station payloads. Shuttle planners are used to dealing with delays brought on by leaks, jammed hatches, O-rings and other problems with the shuttle itself. But the prospect of having such large chunks of the shuttle schedule held hostage to external forces is something new. "We're just waiting to see what the space station program wants to do, and then that will influence our manifest," Oswald said after the hearing. "We're waiting on some things that are going to be thrown at us by folks that, not only do we not have control over, but who are outside the borders of this country." [The Orlando Sentinel, March 14, 1997, p A-5.]

March 17: STARGAZERS ARE HAILING HALE-BOPP

It's hard to miss the biggest comet to approach Earth in 420 years. Hale-Bopp's tail is several million miles long. Ever since the Kohoutek and Halley's comets fizzled in the 1970s and 1980s, astronomers have been leery of promoting comet-watching because of the public letdown. But this comet, discovered July 23, 1995, by Alan Hale in New Mexico and Thomas Bopp in Arizona is different, experts say. The difference is size. The nucleus of Hale-Bopp, just the icy and dusty core of the head, is 25 miles across. Last year's Comet Hyakutake, which astronomers marveled at, was 1 mile across. The last comet of this size to come between Earth and the sun was in 1577. In 1811, a similar-sized comet came in this general neck of the solar system but not between the Earth and the sun like Hale-Bopp. [The Orlando Sentinel, March 17, 1997, p A-1.]

March 18: ROMINGER TO REPLACE ASHBY AS STS-85 PILOT

Astronaut Jeffrey S. Ashby (Cmdr., USN), has been replaced as pilot for the STS-85 crew by astronaut Kent Rominger (Cmdr., USN), a two-time Shuttle pilot. Ashby, who will be reassigned to a later flight, has been named as an assistant to the Director, Flight Crew Operations. Rominger will join Commander Curt Brown, Payload Commander Jan Davis, Mission Specialists Robert Curbeam, Jr., and Stephen Robinson, and Payload Specialist Bjarni Tryggvason, on a 11-day mission in July aboard Discovery to study changes in the Earth's atmosphere. [NASA News Release #97-42, March 18, 1997.]

**March 20: NASA MANAGERS SET APRIL 3 AS LAUNCH DATE FOR
THE MICROGRAVITY SCIENCE LABORATORY MISSION**

Following completion of the Flight Readiness Review today, NASA managers set April 3, 1997, as the official launch date for NASA's Microgravity Science Laboratory (MSL-1) mission. The focus of the upcoming mission, designated STS-83, will concentrate on NASA's efforts to further understand the subtle and complex phenomena associated with the influence of gravity in many aspects of daily life. The STS-83 flight mirrors future work set to take place aboard the International Space Station. STS-83 will be the 22nd flight of Columbia and the 83rd mission flown since the start of the Space Shuttle program in April 1981. The crew of mission STS-83 includes: Commander Jim Halsell; Pilot Susan Still; Mission Specialists Janice Voss; Michael Gernhardt and Donald Thomas; and Payload Specialists Roger Crouch and Greg Linteris. Thomas, who suffered a broken ankle following a routine training exercise on Jan. 29, has officially been cleared to fly as planned. The launch window for STS-83 on April 2 opens at 2:01 p.m. EST and extends for 2 hours, 30 minutes. Columbia's mission duration is planned for 15 days, 16 hours. The STS-83 mission will conclude with Columbia's landing at Kennedy Space Center on April 19 at about 7:30 a.m. EDT. [NASA News Release #49-97, March 20, 1997.]

March 21: SPACE JUNK DANGERS RISE WITH TRAFFIC

Thousands of pieces of space junk are orbiting Earth at enormous speeds, threatening to smash into satellites and manned spaceflights and interfering with astronomical observations. After a three-day conference on space junk, scientists from 18 countries said while the probability of such collisions remains small now, the hazard would increase as the skies become more crowded. The first confirmed collection between a working satellite and space trash occurred July 24, when a French microsatellite was damaged by a fragment of the exploded third stage of an Ariane rocket, they said. Almost 300 new satellites are scheduled to be launched during the next two years, 75 percent more than the previous two years. Since "cleanup in space is neither technically nor financially feasible, efforts must be directed toward reducing and avoiding the creation of space debris," the scientists said Wednesday in a statement. Only 5 percent of the more than 10,000 trackable, man-made objects orbiting the Earth are operational. The rest is debris from sources such as exploded rocket stages and old satellites. In addition, an estimated 70,000 to 150,000 orbiting bits -- smaller than 4 inches -- pose a bigger risk because of their greater number, the statement said. A half-inch diameter fragment, traveling at an average of 17,400 mph, can destroy a \$100 million satellite. NASA has had to replace 50 tiles on its space shuttles that were damaged by tiny debris. [Florida Today, March 21, 1997, p 11A.]

FINDINGS OF COUNCIL SURVEY HIGHLIGHT SPACE PROGRAM'S IMPACT ON THE NATION'S OUTLOOK, NASA ADMINISTRATOR SAYS

A national survey released today by the Council for Excellence in Government highlights the importance of space exploration to the American public, NASA Administrator Daniel S. Golding said. The survey, conducted for the Council by the research firms of Peter D. Hart and Robert M. Teeter, indicates that "promoting space exploration" is the only one of 16 tested items about which a plurality of Americans say the Federal government has been very successful. "This survey demonstrates again the importance Americans place on exploration and discovery," Goldin said, "and their belief that one of the most important roles of the Federal government is to help push back the boundaries of knowledge. NASA is not only a crucial investment in our national future -- it is also a tangible symbol to the American people of the greatness to which we aspire. We are gratified to learn from this survey that NASA has been successful in meeting the needs of the American public." Goldin said. "In recent years, we have redoubled our efforts to be responsive to the public and to describe, in meaningful terms, the value and relevance of space exploration. NASA's original charter mandates that the Agency widely disseminate the results of its activities. Our philosophy is one of openness, of sharing the triumphs and set-backs of our cutting-edge research," Goldin said. "As a result, the public has shared these experiences and many feel a sense of direct ownership or involvement in NASA's programs. This is how it should be -- NASA's programs are, indeed, their programs." [NASA News Release #97-50, March 21, 1997.]

NASA HOPES RESEARCHERS' SHOWERS MAKE LAB PLANTS FLOWER

Neil Yorio shed his clothes, turned on a special faucet at a Kennedy Space Center lab Friday and started a \$150,000 NASA experiment. He showered for science. Researchers collected the used water and added it to the waste water from a load of laundry that included Yorio's dirty shirts, socks and towels. Then the murky mixture was fed to 20 potato plants and 400 wheat seedlings with no filtering or treatment. If the wheat and potato plants survive and grow, the National Aeronautics and Space Administration may have solved some of the problems that will face future colonies on Mars and other outposts where resupply ships will make infrequent stops. NASA needs to find the best way to deal with used shower and laundry water. At the same time, scientists need to come up with the most efficient way to provide scarce water for plants. If astronauts don't have to treat their water, it will save the space, money and fuel needed for a filtration system, said NASA research manager John Sager. But first the red Norland potato plants and Yecora Rojo wheat seedlings have to do their part. Microbes already on the plants' root systems should discard the soap and attack the human microbes left over from Yorio's skin and shirts, said microbiologist Jay Garland, another shower volunteer. Cell membranes, especially on wheat, are good filters, he said. The wheat kernels shouldn't have any remnants of soap or human

microbes because the kernels grow away from the roots that are being watered. The potatoes are another matter. Mackowiak guesses that the inside of the potato should not be changed by the waste water, but the skin could need extra scrubbing. If they thrive, the plants will undergo a month of tests for toxins, proteins and other residues before they are ready to eat -- probably in June. The project involves 18 researchers during the next 84 days. The study is part of a \$1.5 million research program at KSC to find ways to grow plants for self-sustaining space colonies. It is one of the few research projects at KSC. [The Orlando Sentinel, March 22, 1997, p A-3.]

March 22:

**ANNIVERSARY MARKS MILESTONE OF
U.S. PRESENCE IN SPACE**

March 22 marks the one-year anniversary of a continuous U.S. presence in space, which began with the launch of astronaut Shannon Lucid aboard Space Shuttle Atlantis on the STS-76 mission to the Mir space station. Since Lucid arrived on Mir, astronauts John Blaha and Jerry Linenger have followed in her footsteps, conducting continuous scientific experiments aboard the Russian complex as a precursor to the development and occupancy of the International Space Station. Linenger will remain aboard Mir until mid-May, when he will be replaced by astronaut Mike Foale, who, in turn, will be replaced in September by astronaut Wendy Lawrence. The final U.S. astronaut selected for a tour of duty on the Mir is David Wolf in early 1998. Former astronaut Norm Thagard was the first U.S. astronaut to live and work on the Mir. Thagard spent four months on the Russian outpost in 1995. Lucid spent a U.S.-record 188 days in space from the time of her launch on March 22, 1996, to her return to Earth on the STS-79 mission on Sept. 26, 1996. Blaha, who arrived on the STS-79 mission on Sept. 16 last year, spent 128 days in space, returning to Earth aboard Atlantis at the completion of the STS-81 mission on January 22, 1997. Linenger was launched on the STS-81 mission on Jan. 12. [NASA News Release #97-45, March 17, 1997.]

March 23:

**EG&G FLORIDA FIREFIGHTER COMPETES
AGAINST ASTRONAUT**

Firefighter Dawn Tait not only has tested her flame-battling tactics in national competition, she has matched skills with NASA astronaut Pam Melroy. While EG&G Florida firefighter Tait was training on the Combat Challenge Team for the December's World Challenge V in Las Vegas, Melroy became interested in the regimen Tait followed, such as running the stairs at the Vehicle Assembly Building. She was challenged to a head-to-head competition with Tait. Although this was Tait's first year of competition, the Mims resident placed sixth among 23 women competing at the finals. The contest presented a unique meeting between firefighter and astronaut. Tait, as a member of the Search and Rescue team, would be required to rescue Melroy and other astronauts in case of an emergency situation. The high level of physical fitness the firefighters must be in at all times to enable them to do their

jobs was evident to Melroy as she made her way through the competition against Tait. The Challenge consists of five tasks firefighters can be called upon to perform at a fire. Each contestant wears firefighting pants, coat, boots, helmet and gloves and is breathing on a self-contained breathing apparatus. This equipment weighs 40 to 50 pounds. The tasks are: carrying a high rise pack of hose weighing 45 pounds to the fifth floor; pulling up a bundle of hose weighing 45 pounds from the same floor; descending the stairs and striking a 160-pound iron sled a distance of 5 feet using a sledgehammer; walking to a 50-foot section of charged hose line and advancing it 75 feet; and picking up and dragging a mannequin weighing 175 pounds a distance of 100 feet. All of these events are done nonstop. An acceptable time for completion is seven minutes. Tait completed her contest in 3 minutes 40 seconds. While in Las Vegas, the EG&G Florida firefighters, Melroy and 40 other Florida firefighters made goodwill visits to the children's wards of two hospitals. As the base operations contractor to NASA at KSC, EG&G Florida provides a broad range of support services for the KSC mission, encompassing management, operations, maintenance and engineering for KSC utilities and facilities, health, fire and security services, and certain technical and administrative operations. [Florida Today, March 23, 1997, p 2B.]

NASA OFFERS SCHOOLS FREE SURPLUS SOFTWARE

Kennedy Space Center is offering free computer software to educational institutions through a recently established surplus software loan program. As another component of KSC's ongoing educational support efforts, this loan program complements the special one-time computer system donation program that KSC featured last year as well as an on-going program that allows schools to claim surplus computer hardware. KSC program coordinator Doug Hendriksen explained that "there is a continuous turnover of software at the Space Center, and we regularly receive a wide range of DOS-based and Windows applications for our loan program." Although the inventory of software changes regularly, there is normally a good selection of word processing, graphics, spreadsheet, database management and specialized applications available for all educational levels. "We also have a limited selection of networking and MacIntosh software at hand," he added, as well as other accessories such as keyboards, mice, cables and computer plug-in boards. "There is not a lot of red tape involved in this program," Hendriksen said. "All we ask is that schools have some idea of what they are looking for before they call. If we have what they want, we will arrange for them to come out and pick it up." [Florida Today, March 23, 1997, p 2B.]

March 24:

ATTITUDE CONTROL

Russia's creaky Mir space station is back on track after giving its three-man crew and ground controllers in Moscow several bad moments last week when its attitude control system failed. The crew had to burn about 10 kilograms of fuel to stabilize the orbiting laboratory when the onboard computer left it out of control in all three axes

while switching to a backup angular rate sensor when the main sensor failed. That left Mir in a low-power attitude relative to the sun, which forced the crew to shut down the main gyroscopes and other electrical equipment. Russian officials quickly assured NASA managers that Mir's structural limits were never approached, but other answers about the incident were slow in coming. [Aerospace Daily, Mar 24, 1997, p 433.]

HEALTH CHECK

Frank Culbertson, NASA program manager for the Shuttle/Mir phase of the International Space Station program, is in Russia this week for a previously scheduled meeting with his Russian counterparts. But before he goes home to Houston he'll stop in Washington for a headquarters review of the state of the aging Russian orbital platform. Top space flight officials want Culbertson's views on whether Mir is safe and can handle an extension of its service life under a deal worked out last year that would keep U.S. astronauts aboard until at least May 1998. Fire and mechanical failure have left the crew relying on a single backup system for oxygen production, and Russian controllers are worried about the state of one of Mir's docking ports seals after an aborted docking maneuver last month left it exposed to the space environment. [Aerospace Daily, Mar 24, 1997, p 433.]

STATION HARDWARE COMING TO KSC IN JUNE

Despite delays in building the International Space Station, NASA will bring the first U.S.-built piece of the outpost to Kennedy Space Center this summer to prepare for launch. The first component -- a hallway segment that will be carried into space aboard shuttle Endeavour -- is due at KSC the first week of June. It was supposed to be ferried into orbit in December, but Russian delays in building a third component of the station could delay Endeavour's flight as much as eight months. Successive U.S. pieces are expected to arrive as originally planned at KSC, where they will be prepared for flight -- whenever that might be. NASA officials are waiting to see what the cash-poor Russian Space Agency can do to get back on track with the third station segment, which would serve as living quarters and keep station parts boosted in orbit. The delay could benefit NASA, which might be able to test U.S. segments together at KSC because their time there likely will overlap. Original plans called for the pieces to be checked out individually. [Florida Today, March 24, 1997, p 1A.]

ENDEAVOUR ALL FIXED UP BUT WITH NO PLACE TO GO

NASA's newest space shuttle, fresh from \$40 million worth of refurbishing, returns this week to Kennedy Space Center, where it may sit for more than a year. Space shuttle Endeavour's next scheduled flight is to launch part of the international space station. Whenever that is. Space station construction keeps getting delayed because the Russian space program is far behind in building a crucial component and has little money. It's not just the immediate fate of Endeavour, which first flew in 1992 and

last flew in May 1996, that is tied to an ever-changing space station, said Howard McCurdy, a professor of public policy at American University in Washington. The entire shuttle program depends heavily on the space station's future. The shuttle program's long-term future consists mostly of flights to help build and resupply the \$43 billion space station. [The Orlando Sentinel, March 24, 1997, p A-5.]

March 25:

**HOUSE SCIENCE BACKS SPACE STATION
WITH OR WITHOUT RUSSIANS**

Most members of the House Science Committee have endorsed a panel position paper that supports completion of the International Space Station even if Russia drops out as a Station partner, although a perennial Station foe on the committee has signaled his intention to use Russia's Station problems as an argument against the project this year. In its annual "views and estimates" statement submitted to the House Budget Committee, the science panel membership noted that Russia's failure to deliver promised Station hardware on time has hampered the Station program over the past year. "We would prefer to continue the program with the Russians, but we support the Space Station regardless of their participation," stated the panel, whose new chair, Rep. F. James Sensenbrenner, Jr. (R-Wis.), has consistently urged caution in bringing the Russians into the Station project. [Aerospace Daily, Mar 25, 1997, p 441-442.]

**NASA WILL USE ROBOTS IN 2001 TO STUDY HUMAN
EXPLORATION OF MARS**

NASA will begin scientific studies on the surface of Mars in 2001 designed to aid planning for human exploration of the Red Planet, the U.S. space agency said yesterday. With an eye to human exploration, the previously scheduled Mars lander mission for 2001 will include experiments designed to measure soil properties and the surface radiation environment, as well as hardware to demonstrate the production of rocket propellant from the Martian atmosphere. "For the first time since the 1960s, NASA's space science and human space flight programs are cooperating directly on the exploration of another planetary body," Wesley T. Huntress Jr., associate administrator for space science, said in a statement announcing the cooperative agreement. [Aerospace Daily, Mar 26, 1997, p 450.]

March 26: KSC CHIEF: AGENCY MUST KEEP ABREAST OF CHANGES

Looking down a very uncertain road, Kennedy Space Center's new boss called Wednesday for the spaceport to adapt to significant changes in the aerospace world or become obsolete in a few decades. "We've got to keep our eyes on the ball," KSC Director Roy Bridges said. "We've either got to stay on top of the latest developments in the space business or we can easily fall too far behind to take part in its future." Among the possibilities Bridges suggested was using KSC as a base to launch human expeditions to Mars. If not, he said, more of the center could become part of the

Merritt Island National Wildlife Refuge. Bridges, a former astronaut who has been on the job three weeks, made his remarks to hundreds of Brevard County community and business leaders gathered at KSC to hear an annual state-of-the-center address. He said KSC and Cape Canaveral Air Station are facing more competition from launch sites in other states and nations vying for a lucrative piece of the growing commercial space market. The proposed development of a revolutionary new vehicle called the X-33 -- which would take off and land like an airplane and could replace NASA's shuttle fleet by 2012 -- also poses a major threat. The reason: It will make most of KSC's vast infrastructure, built during the mid-1960s, unnecessary. Bridges said KSC already has lost out on becoming the test site for the X-33, which will be built by Lockheed Martin. The final version of the X-33 prototype, called VentureStar, is expected to reduce the time needed for launch from four months with a NASA shuttle to a few days. The goal also is to reduce the cost of launching the vehicle, from \$500 million for a shuttle mission to \$10 million to \$20 million for VentureStar. "We need to look at why we lost that opportunity and learn what we can do in the future not to miss out on other important opportunities," Bridges said. Among those attending Bridges' address was Monica Banos-Russo, marketing director for Melbourne Square mall, who said she was impressed with Bridge's focus on the future. "He's got vision for keeping the space center going in the coming decades. Of course, that's important to our mall merchants and the local economy in general," she said. [Florida Today, March 27, 1997, p 1A.]

March 27:

SHUTTLE ORBITER ENDEAVOUR RETURNED

The Shuttle Orbiter Endeavour returned to the Kennedy Space Center on Mar. 27, riding atop NASA's Boeing 747 shuttle carrier aircraft. The homecoming followed an eight-month modification period at Boeing North American facilities in Palmdale, Calif. About 100 modifications and upgrades were added and its weight was reduced by more than a ton under a U.S. Alliance contract. The most significant change involved removal of Endeavour's original internal airlock and installation of a new payload bay airlock to enable Endeavour to dock with the new international space station. In addition, modifications were made to allow future installation of a new assembly power converter unit to make the orbiter electrically compatible with the future station. [Aviation Week & Space Technology, April 7, 1997, p 60.]

HOUSE HACKS KSC HANGAR BUDGET PLAN

A proposal to use \$5 million in state taxes to build a hangar at Kennedy Space Center -- touted as crucial to the center's long-term survival -- was alive Thursday, but walking with a limp. Supporters were scrambling after learning that House leaders proposed spending only \$496,841, money Spaceport Florida Authority would use to build the multiuse facility near the shuttle landing strip. Proponents say the hangar is vital to attracting the next generation of spacecraft, including the replacement for the space shuttle, which is set for retirement in 2005. Dubbed the "Reusable Launch

Vehicle," the new spaceship will have exotic engines, and could launch and land from almost any state. Arizona and New Mexico are vying for the privilege, but politicians will have little say where it is deployed. Instead, private contractors are supposed to find the most cost-efficient home base. [Florida Today, March 28, 1997, p 6A.]

**March 29: 26 ON KSC TOUR BUSES SLIGHTLY HURT;
 THOUSANDS LOSE POWER**

A sudden afternoon thunderstorm Saturday in Brevard County uprooted trees, downed power lines, turned over boats and injured at least 26 people on two tour buses at the Kennedy Space Center. Most of the people received minor injuries when glass on the double-decker tour buses in which they were riding was shattered from winds that gusted upward of 60 mph and flying debris, authorities said. The injured from KSC were brought to three area hospitals -- Parrish Medical Center in Titusville, Cape Canaveral Hospital in Cocoa Beach and Wuesthoff Hospital in Rockledge -- where they were treated and released. Bob Emerson, his wife, Joyce, and their daughters Rachel, 7, and Megan, 9, of Tarpon Springs were among the injured on the two damaged tour buses. The buses were near the Vehicle Assembly Building at KSC when a sudden gust of wind whipped up, Emerson said. [Florida Today, March 30, 1997, p 1B.]

March 30: TITUSVILLE, KSC CLEAR DEBRIS AFTER SEVERE STORM

Saturday afternoon's sudden storm left Titusville residents and Kennedy Space Center workers picking up debris and surveying damage Sunday, but weather officials were not saying it was a tornado. Winds gusting to 66 mph did more damage and caused more power outages than typical afternoon storms that blow up around the Space Coast. At Kennedy Space Center on Sunday, officials reported damage including an overturned work trailer, 26 dinged and dented vehicles and minor problems at the Vehicle Assembly Building. A portable access stand, used in working on orbiters, was blown over at the VAB. The facility's huge doors often are left at least partly open. No damage was reported to space shuttle Columbia or its boosters and external tank. The shuttle was on the launch pad Saturday and is scheduled to fly Thursday. "Considering how large a facility this is and how much is exposed to the elements, the damage wasn't that bad," NASA spokesman Bruce Buckingham said. "Because it was Saturday, there weren't as many people and cars out here, so that was fortunate." Three KSC tour buses were damaged by fly debris. Forty people were injured; 26 were treated at area hospitals and released. [Florida Today, March 31, 1997, p 1B.]

March 31: MIR STATUS

NASA believes Russia's Mir space station is good for another year and a half or so, long enough for the last U.S. astronaut scheduled to work there to be collected by the Space Shuttle on STS-91 late in May 1998. The shuttle Atlantis will carry a new 250-

pound oxygen generator to Mir this May, now that the U.S. space agency has determined it will fit in the Spacehab logistics module. Frank Culbertson, NASA program manager for the Shuttle/Mir linkups, has returned from talks in Moscow last week on the status of the aging orbital facility. [Aerospace Daily, Mar 31, 1997, p 471.]

NASA CUTS OFF PIONEER 10 DATA

Pioneer 10 will no longer be supplying data to Earth. As of March 31, flat lines replaced the squiggly ones that had traced the spacecraft's faint radio signals from 6.2 billion miles away. Scientists in the mission control room at NASA's Ames Research Center stopped listening. They decided the limited information from the spacecraft wasn't worth the cost of operating it. The shutdown marked the end of the United States' longest-running space program, which began in 1958 with Pioneer 1 soon after the Soviet Union launched Sputnik I. "It's an old friend," said Rick Eagle, a flight operations specialist who has been tracking the craft for 19 years. Pioneer 10 was launched March 2, 1972 onboard an Atlas Centaur from Launch Complex 36A. Pioneer 10 was the first spacecraft to fly beyond the orbit of Mars; to penetrate and cross the asteroid belt; to provide "in situ" measurements of Jupiter's environment; and to take close-up pictures of Jupiter. It was also the first NASA spacecraft to use all-nuclear electrical power and be capable of operating beyond the influence of the Sun. Pioneer 10 was the first human-made object to leave this solar system. [Florida Today, April 6, 1997, p 1B. A Summary of Major NASA Launches, July 1980, p I-39.]

NASA STILL CUTTING JOBS, BUT HARRIS CORP. IS ON HIRING SPREE

While the nation's space program peels away hundreds of jobs annually, Harris Corp. is spawning jobs in Brevard County almost as fast as NASA is losing them. The space agency and its contractors lost almost 750 jobs last year at Kennedy Space Center as budget cuts and streamlining put a squeeze on the local work force, National Aeronautics and Space Administration officials say. More job cuts lie ahead for the space program. NASA plans to eliminate 1,400 jobs at KSC by 2000. Similar projections are not available for the space program's contractors. Harris' shift from defense programs to nondefense and commercial contracts has fueled growth. [The Orlando Sentinel, March 31, 1997, p 10.]

WILHIDE NAMED ASSOCIATE ADMINISTRATOR FOR PUBLIC AFFAIRS

NASA Administrator Daniel S. Goldin today named Peggy C. Wilhide as the Associate Administrator for Public Affairs, effective immediately. Wilhide will replace Laurie Boeder, who joined the Department of Health and Human Services as

the Deputy Assistant Secretary for Public Affairs, Policy and Plans. [NASA News Release #97-60, March 31, 1997.]

APRIL

April 1:

COLUMBIA OUT OF STATION LOOP

Call Columbia the odd shuttle out. With sisterships Atlantis, Discovery and Endeavour all set to fly virtually nothing but space station construction missions for five years, Columbia will be the only NASA orbiter left to launch any and all other missions. "It allows us to schedule flights other than space station assembly flights -- like Hubble Space Telescope repair missions and space radar laboratories and other stand-alone science flights -- on essentially a dedicated vehicle," said former astronaut Steve Oswald, NASA's director of space shuttle program requirements at the agency's headquarters in Washington, D.C. Once construction gets under way, Atlantis, Discovery and Endeavour will divvy up a total of 27 station assembly missions to be flown by mid to late 2002. Columbia won't be involved because it weighs 7,000 pounds more than its sisterships. That heft, combined with the weight of station payloads, makes it too heavy for station-assembly work. So the 90-ton shuttle will be flying what NASA sees as important but less glamorous science missions that will pave the way for research aboard the station, which will be a 440-ton cluster of labs and dorms 250 miles above Earth. The station assembly job, meanwhile, has required NASA to outfit Atlantis, Discovery and Endeavour with cargo bay docking devices that will enable those shuttles to link up with the outpost during and after its construction. Columbia, as a result, is the only NASA orbiter that can carry cargo that fills up most of, if not an entire, a 60-foot-long, 15-foot-wide shuttle payload bay. NASA's prized Advanced X-Ray Astrophysics Facility, which is scheduled for launch aboard Columbia in August 1998, is one such payload. The orbiter also might be considered for missions to test advanced shuttle systems being designed to keep the \$8 billion fleet in business well into the next century. [Florida Today, April 1, 1997, p 1A & 2A.]

MINOR PROBLEMS WON'T GET IN COLUMBIA'S WAY

The weather looks promising for the space shuttle Columbia's 2:01 p.m. launch Thursday (April 3, 1997), and even technical problems have been minor. There's an 80 percent chance the skies will be clear for the launch, with showers only a slight worry. On the technical side, NASA had two small concerns: a faulty overhead instrument display unit and a malfunctioning sensor on group equipment. The display unit shows health and flight information and provides data to help Cmdr. Jim Halsell fly Columbia. The readings on the unit periodically become dim, said NASA Test Director Doug Lyons. There is another device over the head of pilot Susan Still, but NASA likes to have both working properly. The faulty unit may be replaced early this morning. NASA has two ground sensors that detect hazardous gas around the shuttle's fuel tank. One was not working. However the backup is functioning properly, and that's all NASA needs, Lyons said. [The Orlando Sentinel, April 2, 1997, p A-13.]

COLUMBIA PILOT'S CAREER TAKING OFF

Navy Lt. Cmdr. Susan Still, 35, will pilot the space shuttle Columbia on its 16-day mission to study how zero gravity changes flames, metals and crystals. It's the same shuttle she saw launch as a student at Embry-Riddle Aeronautical University in Daytona Beach. "I really formed my desire to be an astronaut there at Embry-Riddle," Still said at a recent news conference in Houston. "My goals and dreams sort of evolved from there." Still, who got her private pilot license when she was 16, has spent her career doing things that few women have done before. She is only the second woman to pilot a shuttle. The pilot of a shuttle is similar to an airline co-pilot, assisting the commander who does most of the piloting. After graduating summa cum laude with a bachelor's degree in aeronautical engineering, Still worked on wind tunnels for Lockheed Corp. in Marietta, Ga. While there, Dick Scobee, who later died as commander of the shuttle Challenger, told her if she wanted to be an astronaut she should join the military. The young pilot finished first in her class at officer candidate school in Pensacola. After that, Still finished first in her class at jet school, became a flight instructor, a Navy Top Gun pilot and mastered the difficult F-14 jet. At NASA, Still thrived even more. She is the first to fly from a group of 19 astronauts that NASA hired in December 1994. [The Orlando Sentinel, April 1, 1997, p A-1 & A-4.]

LUNAR LANDING

A meeting of NASA astronauts convened at Orlando's Church Street Station, but the conversation never got past introductions. That's because the astronauts were actors in *From the Earth to the Moon*, the 13-part HBO miniseries about the Apollo moon missions being filmed in Central Florida. The interruptions were courtesy of executive producer Tom Hanks, who is directing the series' opening installment about the Mercury and Gemini program, which predated Apollo. Although it will be the first to air, Hanks' installment is the third film in Central Florida since production began Feb. 12. Originally scheduled to air in December, *From the Earth to the Moon* is now slated for early 1998. During a lull, Hanks -- a two-time Academy Award for his roles in *Forrest Gump* and *Philadelphia* -- discussed the project with unabashed enthusiasm that would have better fit the boyish character he played in *Big*. When Hanks talked about the Apollo program, his eyes opened wide and he spoke quickly. "Our desire isn't anything more than anybody else wants to do with a movie," Hanks said. "We want the audience to be enthralled." Still, producers have scoured every available documentary and book on the space program to ensure accuracy, Hanks said. The main source is Andrew Chaikin's *A Man On the Moon*, about the manned Apollo missions. Although the plot contains fictional elements, the goal is "five accuracies for every inaccuracy," Hanks said. "It's not a documentary, but we're always trying to be authentic to the nature of what was going on." Hanks seemed genuinely thrilled to be working in the cradle of early space exploration in Central Florida and talking with NASA experts who are working as consultants on the nine-month project. Sound

stages at Disney-MGM Studios are laden with historic artifacts, including a NASA gantry once used by Apollo astronauts. [The Orlando Sentinel, April 1, 1997, p C-1 & C-6.]

LYMAN SPITZER, FATHER OF HUBBLE TELESCOPE, DEAD AT 82

Lyman Spitzer Jr., credited with conceiving the Hubble Space Telescope and launching research in fusion aimed at developing a cheap, inexhaustible fuel supply, died at his home in Princeton, N.J., on Apr. 1. The pioneer in astrophysics and plasma physics was 82. [Florida Today, April 2, 1997, p 2A. Aviation Week & Space Technology, April 7, 1997, p 29.]

April 2:

LAUNCH PREPARATIONS BEGIN FOR CASSINI/HUYGENS MISSION

With the shipment of the Huygens probe to Cape Canaveral, preparations are beginning in earnest to launch Cassini/Huygens, a U.S.-European effort to explore Saturn -- and likely the last of the \$2 billion-plus flagship planetary missions. The six-ton combination of a European Space Agency probe, bound to land on Saturn's largest moon, Titan, and a NASA orbiter of the ringed planet is to begin its seven-year cruise to Saturn Oct. 6. The European component of the mission, the Huygens probe, completed its preshipment review on Mar. 25 and left for the launch site at Kennedy Space Center on April 2. The main element of the mission, the Cassini orbiter, will carry Huygens to Saturn and then explore the planet and its rings for four years starting in July, 2004. It was scheduled to undergo a preshipment review this week, according to Richard Spehalski, project manager for Cassini at NASA's Jet Propulsion Laboratory. It all goes according to plan, the orbiter will be shipped to Cape Canaveral at the end of April, he said. As currently scheduled, the Cassini/Huygens spacecraft will receive an initial gravitational assist from Venus on April 21, 1998. A change in trajectory on Dec. 2, 1998, will line up the vehicle for a second assist from Venus set for June 20, 1999. The spacecraft will then effect a flyby around the Earth on Aug. 18, 1999, before receiving a final gravitational assist from Jupiter on Dec. 30, 2000. Entry into Saturn's gravitational field is nominally set for July 1, 2004. Huygens is to be released on Nov. 6, 2004, and is to enter Titan's atmosphere on Nov. 27. [Aviation Week & Space Technology, April 7, 1997, p 44.]

April 3:

COLUMBIA MAY HAVE FLOWN 14 YEARS WITHOUT INSULATED LINES

Shuttle Columbia might have been flying without insulated coolant lines since 1983, which could have caused an emergency landing if the lines had frozen, NASA officials said Wednesday (April 2). As a result, shuttle technicians are finishing work today to wrap the lines in protective thermal blankets so the ship will be ready for a liftoff attempt Friday afternoon. "The prudent thing to do was to just go and take care of the

concern," said NASA shuttle launch operations director Robert Sieck. Columbia had been scheduled to take off today, but its launch was delayed when engineers noticed the coolant lines were not covered with multi-layer insulation. Located in the shuttle's cargo bay, which is exposed to extreme temperatures in space, the metal lines carry water to keep crucial spaceship electronics from overheating. Engineers scoured agency records Wednesday to determine how long Columbia has been flying without insulation on the lines. The shuttle might have flown 15 missions since 1983 without the protection, Sieck said. No problems with the lines, however, were noted during any of the flights, he said. Mission managers, meanwhile, are trying to determine whether engineers at some point decided it was safe to fly without the thermal blankets. The other possibility is the insulation has been inadvertently left off the shuttle for 14 years. The finding prompted NASA to delay today's scheduled launch until 2 p.m. Friday. There is a 90 percent change of favorable weather conditions. [Florida Today, April 3, 1997, p 1A. The Orlando Sentinel, April 3, 1997, p A-1 & A-10.]

KSC ASSUMES NASA'S OCCUPATIONAL HEALTH PROGRAM

KSC recently assumed Agency-wide responsibility for NASA's occupational health program. In keeping with the agency's lead center concept, a memorandum of understanding calls for a shift of appropriate personnel and funding from NASA Headquarters to KSC. The focus of the program is to promote a health workforce and to prevent health hazards in the work place at all of NASA's field centers. To accomplish that purpose, program managers will evaluate and control health hazards, prevent occupational injury, provide quality health care and counseling and ensure agency compliance with related regulations. Though a transfer of at least two civil service positions to KSC is planned, one senior occupational health physician and one environmental health officer, officials are considering the possibility of providing additional personnel. "KSC was selected as the optimal site as its activities encompass all aspects of occupational medicine and environmental health that exist at the other NASA centers," said James D. Collier, M.D., director, Aerospace Medicine Division, NASA Headquarters. [KSC Countdown, April 3, 1997.]

NASA AND DEPARTMENT OF DEFENSE CONTINUE TESTING LASER TECHNOLOGY

NASA and Department of Defense continue testing of laser imaging technology during STS-83 launch. The Space Shuttle Columbia will be used in the testing and demonstration of new Laser Imaging System being developed by Naval Research and Development (NRaD). Transportable tracking systems will be located at the KSC camera site north east of the new Apollo/Saturn V Center, at a CCAS camera site west at launch complex 40 and at a site west of Pad 39B. Columbia's aft end and the aft portion of the solid rocket boosters will be illuminated at specific points during countdown and launch. Previous tests have included expendable launch vehicles, the

Space Shuttle Columbia on mission STS-80 and the Space Shuttle Atlantis on mission STS-81. [KSC Countdown, April 3, 1997.]

DELTA BLAST CAUSED BY SPLIT BOOSTER

The casing of a solid rocket booster split apart in flight, triggering the Jan. 17 Delta rocket explosion that showered a Cape Canaveral launch complex with flaming debris, the Air Force said Thursday. Still unclear, however, is what caused the casing to crack open, setting off a blast that destroyed the rocket and its cargo -- a \$45 million military navigation satellite. In its first public comment on the cause of the accident, the Air Force released a one-page statement that said the graphite-epoxy casing of one of the Delta's nine strap-on, solid-rocket boosters split 7.2 seconds into flight. The booster casing continued to crack open for another six seconds -- growing to some 203 inches in length -- before the booster "failed catastrophically" and set off the Delta's automatic destruct system, the statement said. That blast destroyed the rocket's first stage. The second and third stages held together until the destruct signal was sent to the rocket 22.3 seconds into flight. The rocket's nose cone, as well as its 4,100-pound payload, "appears to have remained intact, exploding only on impact with the ground," the statement said. The Delta blew up 1,589 feet above its launch pad, raining burning fuel and car-sized chunks of flaming debris on Complex 17 at Cape Canaveral Air Station. About \$50 million damage was caused as falling wreckage made craters at the complex and on paved roads leading to it. Several administrative trailers and dozens of cars at the site were damaged or destroyed. The Air Force is midway through its investigation into the blast. A safety board, which gathered data and interviewed launch personnel, has completed its work. A separate accident investigation board now will attempt to determine the cause of the rocket booster failure. [Florida Today, April 4, 1997, p 1A.]

April 4: IS SPACE SHUTTLE A THREAT TO OZONE? TESTS MAY TELL

Space shuttle Columbia will get its own version of an emissions test after it launches. Twenty minutes after lift-off, scheduled for 2 p.m. today, an Air Force jet will fly figure-eights through the rocket plume that still will be lingering over Central Florida. The jet will measure chlorine and aluminum in the exhaust. This \$2 million U.S. Air Force study should help scientists figure out to what degree Earth's protective ozone layer is affected by rocket and shuttle launches. After years of studying exhaust from solid-rocket boosters, scientists now think the plume does not play a significant role in damaging the ozone. But those studies are based only on computer models, not on actual exhaust measurements, said Martin Ross, an Aerospace Corporation engineer who is running the three-year Air Force study. As part of the study, the Air Force has flown through Titan and Delta rocket plumes over the past few months. But this will be the first time a jet will take measurements of the shuttle's exhaust. Launches involving solid rocket boosters expel about 725 tons of chlorine into the Earth's stratosphere each year. By comparison, air conditioners, aerosols and other devices

spew about 2.9 million tons of the chemical into the air each year, said NASA atmospheric scientist Charles Jackman. A sudden tear or dent in the ozone layer probably occurs after rocket launches, but within a few hours, the ozone layer over the launch site is back to normal, Ross and others said. [The Orlando Sentinel, April 4, 1997, p A-8.]

COLUMBIA SPRINTS INTO ORBIT

Seven astronauts aboard shuttle Columbia are busy with experiments today after their ship sailed into orbit on NASA's last shuttle laboratory mission before an international space station is built. With five men and two women strapped inside, Columbia lifted off from Pad 39A at 2:20 p.m. EST on a 16-day Microgravity Science Laboratory mission. Launch was delayed 20 minutes, 32 seconds due to an orbiter access hatch seal that had to be replaced. Initial reports from Pad 39A indicate no significant damage resulting from the launch. The solid rocket booster retrieval ships are on station with the boosters and will begin the process of preparing them for tow back to Cape Canaveral Air Station. The crew of mission STS-83 are: Commander Jim Halsell; Pilot Susan Still; Mission Specialists Janice Voss, Michael Gernhardt and Donald Thomas; and Payload Specialists Roger Crouch and Greg Linteris. Halsell and his crew got down to business soon after they reached orbit, opening a \$1 billion cargo bay laboratory the size of a small school bus. Floating through the hatch the crew began powering up experiments similar to those that will be carried out on NASA's planned space station. Built by the European Space Agency, the shuttle lab is making its 14th flight. It will fly once more in August 1998 before international crews move research to the new station about midway through construction. [Florida Today, April 5, 1997, p 1A. Kennedy Space Center Space Shuttle Status Report, April 4, 1997.]

SPACE LEGEND WATCHES SHUTTLE LAUNCH

Neil Armstrong, the first man to walk on the moon, was on hand for Columbia's liftoff. Delayed 20 minutes because of minor technical problems, Columbia shot through sunny skies as Apollo 11 astronaut Neil Armstrong attended his first shuttle launch. Armstrong did not give any interviews. Although Armstrong captivated the public in 1969 with his walk on the moon, the crew he saw go into space will barely be noticed now that they are up there, NASA officials conceded. "Most of the stuff we do is boring" to watch, said Ed Gabris, NASA's director of commercial research. "But we're working on things that help the everyday man." A capacity crowd of 11,000 people jammed into Kennedy Space Center for the launch, which coincided with college spring break. [The Orlando Sentinel, April 5, 1997, p A-16.]

April 6: MIR'S CREW MAY HAVE TO ABANDON STATION

If the troubled Russian space program cannot launch a resupply rocket today, two

cosmonauts and an American astronaut likely will have to evacuate the Mir space station because its air gradually will become toxic. After emergency repairs failed Saturday, space officials in both countries focused their hopes on today's scheduled launch from Kazakstan. The Progress rocket would dock with the crippled Russian space station on Tuesday (April 8). If Progress doesn't make it, and with their air supply threatened, the two Russians and American Jerry Linenger would begin preparations to return to Earth in their escape vehicle, the Soyuz space capsule that flew the cosmonauts into space. The decision to leave the station probably would be made within the week. If Progress doesn't launch, "then we'll worry," said Frank Culbertson, NASA shuttle-Mir program director. "There's no need to worry about something that hasn't happened yet." Meanwhile, life aboard the creaky space station has worsened over the past few weeks. Several pieces of equipment that make oxygen, cool the station and remove carbon dioxide from the air have broken down or had to be shut down. And Progress is only a partial solution; it simply carries replacement parts for patchwork repairs. With these problems, NASA will rethink its plans to send more astronauts to Mir, Culbertson said. [The Orlando Sentinel, April 6, 1997, p A-6.]

COLUMBIA MAY HAVE TO MAKE EMERGENCY LANDING MONDAY

A battery problem could force the space shuttle Columbia to make an emergency landing Monday (April 7). NASA officials will decide today whether to cut short Columbia's 16-day mission because of a malfunction in one of three fuel cells that mix hydrogen and oxygen to make electricity and water. If NASA is forced to shut down the malfunctioning cell, flight rules require Columbia to land immediately. There are five landing chances at Kennedy Space Center: 11:15 a.m., 12:51 p.m., 2:27 p.m., 4:02 p.m. and 5:38 p.m. There are also four chances to land in California. The second shuttle mission, in 1981, was cut short because of a fuel cell problem, but the cells are considered reliable. [The Orlando Sentinel, April 6, 1997, p A-6.]

CONTROLLED BURN SLATED ON SPACE CENTER LAND

The U.S. Fish and Wildlife Service will be conducting a controlled burn as part of research aimed at developing tools to predict the spread and intensity of wildfires. The Fish and Wildlife Service, along with other local, state and federal agencies, will ignite fires on 600 acres of scrub oak habitat north of KSC's 52-story Vehicle Assembly Building. Officials say the interagency effort will help develop better methods for fighting uncontrolled wildfires in areas where fuels such as wood and scrub have accumulated to hazardous levels. It also is expected to help agencies such as the Fish and Wildlife Service more effectively conduct controlled burns routinely done for habitat management. [Florida Today, April 6, 1997, p 1B.]

REPAIR GEAR HEADS TO MIR

Russia launched a cargo spaceship loaded with crucial oxygen generators and carbon-dioxide removal canisters to the troubled Russian Space Station Mir. The Progress, which blasted off from the Baikonur space center shortly after 8 p.m. Moscow time, contained three fire extinguishers to replace those used to put out a fire aboard Mir in February. Also among the 2-ton cargo: parts to fix one of Mir's two broken oxygen generators as well as food and scientific equipment. The Progress-34 ferry is due at Mir on Tuesday (April 8). [Florida Today, April 7, 1997, p 1A.]

April 8:

SHUTTLE CREW WRAPS UP MISSION

Shuttle Columbia's seven astronauts will attempt an early return to Earth today, guarding against the possibility of a second power generator failure that could cripple the \$2 billion spaceship. Four days after launch, Columbia's crew will cut short their planned 16-day mission and try to land at Kennedy Space Center at 2:33 p.m. The \$500 million mission is being abbreviated because of an unusual change in voltage levels within one of Columbia's three fuel cells, which use volatile liquid hydrogen and liquid oxygen to generate electricity to power all spaceship systems. NASA is considering two landing opportunities at KSC today, the second at 4:09 p.m. Two chances at backup runways at Edwards Air Force Base in California also are scheduled. Those will come at 4 p.m. and 5:36 p.m. EDT. The weather outlook for landing is relatively good, although NASA will keep close tabs on crosswinds that could be strong enough to push Columbia toward the edge of runways at either site.

Mission managers gave Columbia's crew a "go" for deorbit burn to occur at about 1:31 p.m. EDT, setting the vehicle on a course for landing at KSC's Shuttle Landing Facility. Landing occurred on the first opportunity at 2:33 p.m. EDT on runway 33. Columbia may get a chance to fly again -- as early as July, NASA shuttle manager Tommy Holloway said after the landing. NASA managers will decide within a week whether to launch Columbia's experiments and crew on a makeup mission. Columbia's flight was the fourth shortest for a shuttle. Astronauts were only able to conduct 15 percent of their 305 experiments. An attempt to grow nearly 800 plants, disease cells and crystals during the mission is probably a total loss. [Florida Today, April 8, 1997, p 1A. Bruce Buckingham. (1997). **Kennedy Space Center Space Shuttle Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe/shuttle-status [1997, April 8]. The Orlando Sentinel, April 9, 1997, p A-5.]

NASA: STUDY OF SHUTTLE'S FAULTY FUEL CELL MIGHT YIELD LITTLE

NASA will launch a post-flight investigation into Columbia's fuel cell failure soon after the shuttle lands, but the agency's best evidence likely was erased in space. Columbia's faulty fuel cell was shut down in orbit Sunday to avoid the remote chance

that an unusual change in voltage levels might cause it to overheat, sparking a fire or explosion in space. But in doing so, internal fluids were left to slosh around freely, likely washing away any evidence of contaminants that might have triggered the failure. NASA engineers say it will be difficult to duplicate the failure during tests as a result. "When we shut down the fuel cell in orbit, we probably disturbed the integrity of the system enough that we won't be able to repeat the failure," said Pat Simpkins, chief of NASA's fluid systems division at Kennedy Space Center. In a bid to pinpoint the cause of the failure, NASA will remove a suspect fuel cell from Atlantis, which is scheduled to launch May 15 on a mission to Russia's space station Mir. The Atlantis power plant also experienced prelaunch voltage spikes before launches in January and September 1995. Yet it operated properly on both flights. Both suspect fuel cells will be shipped to their manufacturer for testing. NASA has been using this type of fuel cell for more than 25 years. Replacing the Atlantis power plant is not expected to delay its upcoming flight. [Florida Today, April 8, 1997, p 2A. The Orlando Sentinel, April 8, 1997, p A-1.]

KSC STORM DAMAGE ASSESSMENT COMPLETED

The KSC Emergency Preparedness Office has released a report on the March 28 storm that struck KSC that reveals a total of \$232,340 in damage to facilities, vehicles and special equipment. In addition, a total of 49 persons were evaluated for injuries on site, with 23 transported to area hospitals for treatment. [KSC Countdown, April 8, 1997.]

April 9: NASA REVISES INTERNATIONAL SPACE STATION SCHEDULE

NASA will begin its on-orbit assembly of the International Space Station (ISS) no later than October 1998, and is looking at options that will allow the Agency to work around the delay caused by the late arrival of a key station module. The on-orbit assembly of the International Space Station originally was scheduled to begin in November 1997 with the launch of the NASA financed/Russian-built and launched Functional Cargo Block (FGB). Inadequate funding by the Russian government to the Russian Space Agency (RSA) and its contractors for building another key station element -- the Service Module (SM) -- has put construction up to eight months behind schedule. NASA will determine the timing for decisions which need to be made in the event that Russia is unable to provide its agreed contributions to the ISS program. These decision points will be selected to allow for the timely provision of an alternative capability. NASA has begun initial steps at the working level to accommodate changes to the Space Shuttle manifest. NASA has reassigned the Space Shuttle Endeavour to fly the September 1997 STS-86 mission to the Mir space station instead of the Space Shuttle Atlantis. This change will allow Atlantis to begin its scheduled orbiter maintenance down period several month earlier, which permitting Endeavour a mission prior to flying the first ISS assembly flight in July 1998. Additional adjustments to the remainder of the assembly sequence will be worked in

consultation with the other International Partners and research community over the next several weeks. [NASA News Release #97-65, April 9, 1997.]

AIR FORCE: 4 DAMAGE CLAIMS FROM DELTA BLAST UNFOUNDED

A .45-caliber bullet, not debris from the exploded Delta rocket, tore a thumbnail-sized hole in a Merritt Island couple's roof, the Air Force said Wednesday. The damage claim was one of four made by homeowners after the Delta rocket exploded Jan. 17, seconds after lifting off from Cape Canaveral Air Station. None of the damage claims was determined to be connected to the blast, the Air Force said in a news release. Investigators from NASA and the Air Force found the bullet on a cement block in the roof of the Heatherstone Drive home of Donald Salatka, who lives eight miles from the air station. The bullet penetrated two layers of shingles and wood underneath. Pieces of the roof and the bullet were analyzed at the Kennedy Space Center's Material Science Division laboratory. "It is imperative we take this opportunity to alleviate any concerns that may have been generated about this claim and publicly emphasize that we would not be launching if there was even a remote chance of debris turning up in a populated area outside Cape Canaveral Air Station," said Col. Randy Starbuck, 45th Space Wing commander. KSC Director Roy Bridges said safety procedures require any rocket to be destroyed before it is in a position to toss debris that far. The other three claims alleged a sonic boom caused structural damage to homes, but those were unfounded. [Florida Today, April 10, 1997, p 1A.]

April 10: NEW CHECKOUT AND LAUNCH CONTROL SYSTEM UNDER DEVELOPMENT AT KSC

A NASA-led effort is under way at Kennedy Space Center to design, develop and implement a new Checkout and Launch Control System (CLCS) for the Space Shuttle with the capability to support future launch vehicles. The first major milestone of this five-year effort was reached Mar. 28 with the opening of an experimental control room inside firing room No. 2 in the Launch Control Center. Development of CLCS incorporates a progressive and innovative approach that involves the user community to the fullest extent. The CLCS is the successor to the Launch Processing System (LPS). The shuttle version of LPS dates back to the early 1970s and is the successor to the LPS developed for the Apollo program. The CLCS will be implemented in increments and is scheduled to be fully operational by September 2001. [KSC Countdown, April 10, 1997.]

KSC BEGINS TRANSITION TO LIQUID HELIUM CONVERSION SYSTEM

KSC, the largest federal consumer of helium, has begun a transition from receiving helium in gaseous form to receiving it in a liquid state and converting it to gas on-site. KSC uses over 75 million standard cubic feet of helium per year, primarily to safe the Shuttle and expendable launch vehicles. At present, helium is ordered from a federal

supplier and delivered in gaseous form via high-pressure railcars. A new law mandates that the government must obtain its helium from private industry, prompting the space center to establish a new means of processing it. It has been determined that KSC's large requirements can most cost-effectively be met by transporting the gas in liquid form rather than gaseous. As a result, Sauer, Inc., Jacksonville, FL, has been awarded a \$982,800 contract to modify the Converter/Compressor Facility in KSC's Launch Complex 39 area. This will provide the capability to accept liquid helium from tankers, convert the liquid to gas, and compress the gas to interface with the existing high pressure compressor system. The conversion and compression equipment is slated for delivery later this year under several separate contracts. [KSC Countdown, April 10, 1997.]

April 11:

STATION FUNDING PROMISED:
CONGRESS FIRES WARNING SHOT

Russian President Boris Yeltsin has made an unconditional pledge of \$260 million to enable contractors to resume long-delayed work on the international space station, as an impatient U.S. Congress signaled it won't wait for the money much longer. At a meeting with Russian Space Agency General Director Yuri Koptev on April 11, Yeltsin promised 800 billion rubles (\$139.1 million) this month and another 700 billion rubles (\$121.7 million) in May. The money should enable Russian contractors to resume work on the station's service module, a vital piece of hardware designed to provide long-term attitude control and initial life support for station crews. Many in Russian industry had doubted that the Russian government would ever be able to fulfill its repeated promises to fund the station hardware. But following Yeltsin's pledge, some Russian contractors were expressing new optimism last week.

In Washington, the House Science Committee showed its frustration with Russia last week by unanimously approving a bipartisan amendment that bars NASA from spending U.S. funds on portions of the space station that Moscow is responsible for building. The amendment requires NASA to draw up contingency plans for replacing all Russian-built hardware and to make monthly progress reports on Russia's station work. It also demands that the Clinton Administration decide by Aug. 1 whether U. S. hardware will have to replace key Russian station components.

NASA officials have said Russia's participation in the project is saving the U.S. \$2 billion. But an initial delay in the launch of the service module -- and the resulting slip of the station's first launch -- will cost the U.S. about \$300 million. NASA announced this month it would have to push back the first launch of station components by up to 11 months because of the service module delay. The agency drew up a plan to modify other hardware and use a previously classified U.S. Naval Research Laboratory module that could substitute for the service module until December, 1999. [Aviation Week & Space Technology, April 21, 1997, p 28.]

April 12:

ROBOTS BATTLE BUT THE STUDENTS WIN

Robots squared off Saturday in a friendly battle combining teenage brainpower and inner tubes. To win, robots built by students and adult volunteers from across the nation competed to see which could place more inner tubes on a spinning tower. The contest, held in a temporary arena near Walt Disney World's Epcot Center, was the sixth annual FIRST competition designed to tweak student interest in engineering and to encourage businesses to get involved in schools. It attracted 155 teams from 30 states, including two Central Florida teams -- one each from Seminole and Brevard counties. The Brevard team of Merritt Island and Satellite High students had NASA Kennedy Space Center as its main sponsor. The robot made it to the fourth round, then a cable snapped on its arm. [The Orlando Sentinel, April 13, 1997, p A-15.]

April 13:

**ASTRONAUT SHANNON LUCID WINS
AVIATION CLUB ACHIEVEMENT AWARD**

NASA astronaut Shannon Lucid, who broke world records in 1996 during a six-month stay aboard Russia's space station Mir, recently received the National Aviation Club's first Achievement Award. Lucid, 53, was selected "for her technical expertise, dedicated service and pioneering spirit as a space shuttle astronaut," the club said. Noting that Lucid set the record for the longest space mission by a U.S. astronaut and by a woman, the club cited her research work aboard Mir during a 188-day tour of duty on the Russian station. The trophy Lucid received with the award was to have been presented to Amelia Earhart upon the completion of her planned around-the-world flight. The trophy now is on permanent display at the National Air and Space Museum in Washington, D.C. [Florida Today, April 13, 1997, p 5E.]

April 14:

SHUTTLE FAILURE FORCES TURNAROUND EFFORT

The failure of the space shuttle to carry out a \$500-million Spacelab mission with experiments from 23 countries will spark changes in shuttle countdowns and accelerate development of advanced new electrical fuel cells to prevent a repeat of the events which forced Columbia into a precautionary landing. NASA will this week decide whether Columbia and its Microgravity Science Laboratory (MSL) payload and crew can be reflown as early as July to recover the mission. Although expertly managed by the astronaut crew and controllers at the Johnson and Marshall centers, the flight from a payload success standpoint was the most damaging in-orbit shuttle failure in the 16-year history of the program. The malfunction of one of three oxygen/hydrogen-powered electrical fuel cells forced the unit's shutdown to prevent risk of a fire or explosion. This forced Columbia to land Apr. 8, four days into what had been planned as a 16-day mission. Orbiter fuel cells are built by International Fuel Cells, a unit of Hamilton Standard of Windsor Locks, Conn.

The landing was piloted by mission commander USAF Lt. Col. James D. Halsell and

Navy Lt. Cdr. Susan Leigh Still and was the heaviest in history of the shuttle program, with the vehicle at about 236,000 lb. Columbia's weight was about 11.5 tons heavier than planned for landing because it had to return with about 23,000 lb. of extra oxygen and hydrogen that otherwise would have been used to power the fuel cells to sustain high Spacelab electrical power loads during the planned flight. In hindsight, shuttle managers said the mission should have never been cleared for its 2:20 p.m. launch here Apr. 4, because fuel cell No. 2, which malfunctioned in orbit, showed unusual voltage differential characteristics during the shuttle countdown on Launch Pad 39A. Those characteristics had been seen earlier in a different fuel cell during two countdowns for the orbiter Atlantis on missions to the Mir space station. But those characteristics never led to an Atlantis malfunction, and Columbia was cleared to fly based on this past Atlantis experience, and the fact the unit had flown successfully on three previous Columbia missions. After Columbia's experience, however, countdown criteria on fuel cells will be changed here, managers said. The space shuttle's fuel cells are complex chemical reaction systems, and each has its own electrical characteristics -- one reason the countdown data failed to halt the launch.

Once the cells have been started and are operating under an electrical load, the differences between adjoining 16-cell substacks is normally only about 20-50 millivolts. Early in Columbia's countdown that difference was in the 500-millivolt range in substack 3 of the No. 2 fuel cell. That was enough to spark questions about the cell among launch managers, but as more electrical loads were applied to the unit it began to stabilize over time -- behavior consistent with normal operations, according to Patrick Simpkins, fluid systems division chief for shuttle processing at Kennedy. The shuttle program several months ago began assessments on how to better instrument the existing fuel cells and begin development of more robust fuel cell design that could be retrofitted to the orbiter. Those studies will be intensified as a result of the Columbia incident.

The early return marked only the third time since shuttle flight operations began in 1981 that an orbiter has been forced to land early, but the other two incidents did not affect mission success. An unrelated fuel cell water-flooding problem on Columbia forced Mission 2 to land one day early in 1981, while Atlantis, on Mission 44 in 1991, had to land three days early after deployment of a missile warning satellite. [Aviation Week & Space Technology, April 14, 1997, p 71-72.]

April 15: VINTAGE ET TO CALL KSC VISITOR CENTER HOME

One of NASA's original external tanks (ET) will be calling Kennedy Space Center's Visitor Center home after it arrives from Stennis Space Center, MS, where it has been on display since 1993. The ET was shipped by barge from Michoud Assembly Facility, New Orleans, LA, on April 10 and was scheduled to arrive yesterday (April 14) at the turning basin near the KSC Press Site. The tank will remain in the parking lot until refurbishment and preparations are completed for its permanent display with

the solid rocket boosters adjacent to the Shuttle orbiter mock-up, already on display near the entrance to the Visitor Center. The tank is scheduled to be moved from the Press Site parking lot to the Visitor Center parking lot on April 19. The move is scheduled to begin at 6:30 .m. and take about 6-8 hours to complete. [KSC Countdown, April 15, 1997.]

SPACE SCIENCE AND HUMAN SPACE FLIGHT ENTERPRISES **AGREE TO JOINT ROBOTIC MARS LANDER MISSION**

In a cooperative activity intended to advance scientific knowledge and help lay the groundwork for a future decision on whether to send humans to Mars, NASA's Space Science and Human Exploration and Development of Space enterprises have agreed to jointly fund and manage two robotic missions to Mars due for launch in 2001. This marks the first time since the 1960s that NASA's space science and human space flight programs have directly collaborated on the exploration of another planetary body. [KSC Countdown, April 15, 1997.]

ATLANTIS' BOLTS GET CLOSE LOOK

NASA is looking for loose bolts in its space shuttle fleet, a search that is delaying work on the next shuttle launch. NASA officials hope to be able to launch the shuttle Atlantis as planned on May 15. However, the space agency already is behind schedule getting Atlantis connected to its external fuel tank and booster rockets, and the delay could stretch to nearly a week. After finding loose bolts in the rear section of Discovery and Columbia, officials decided Tuesday to see if a similar problem exists on Atlantis. NASA engineers should have the answer by Friday. The bolts are on part of the system that helps disconnect the shuttle from its massive external fuel tank. However, they are not the critical bolts that connect the shuttle to the tank. If loose bolts are discovered, NASA doesn't know how long it will take to correct the problem, or if it will delay the launch. Atlantis is scheduled to bring supplies, including a new oxygen generator, to the Russian space station Mir. [The Orlando Sentinel, April 17, 1997, p A-21.]

April 16:

NASA AND AIR FORCE SPACE COMMAND **ANNOUNCE COOPERATIVE EFFORTS**

NASA and the Air Force Space Command have agreed to work together in several areas of mutual interest in the hopes of saving both organizations costs and sharing in new technologies to benefit future spaceflight and spacecraft. Under the terms of the agreement signed by Goldin and Air Force Space Commander General Howell M. Estes, III, NASA and the Air Force will form partnership teams to study seven areas of potential cooperation. These areas include studying the cost feasibility of launching Defense Support Program satellites from the Space Shuttle in 1999; possible expanded use of the Shuttle for Air Force technology payloads; and consolidating plans that

outline space transportation needs of NASA and the Air Force. NASA and the Air Force also will examine their respective infrastructures and common-use facilities; develop and coordinate an implementation plan to address orbiting space debris; and possible collaboration on the Clementine II project; and expand cooperation in space weather environment research and data sharing. [NASA News Release #97-68, April 16, 1997.]

HOUSE WARNS AGAINST FUTURE MIR MISSIONS

The United States shouldn't send any more astronauts to the Russian space station Mir until NASA certifies the station meets or exceeds U.S. safety standards, the House Science Committee said Wednesday. The committee also approved legislation to prohibit NASA from transferring any money to Russia or its contractors for the international space station elements Russia pledged to build and pay for. "Cooperation is a two-way street," said committee chairman Rep. James Sensenbrenner Jr., R-Wis. "It can't be all give and no take with the Russians anymore than it can be all take and no give with Congress." NASA already has been keeping a close watch on repairs and has said it will continue to send astronauts there as long as it is satisfied the station is safe. It was not clear Wednesday if such an approach would be enough to satisfy the committee's requirements. The committee's requirements would make NASA produce a detailed plan to replace essential Russian hardware. It also would require NASA's administrator to report to Congress monthly on whether the Russian government is meeting its station funding obligations. Sensenbrenner said the fact "that we are now well down the road of relying on the Russians" kept the committee from expelling the Russians from the program. [Florida Today, April 17, 1997, p 2A.]

GENERATOR READIED FOR LAUNCH TO MIR

A much-needed oxygen generator for the Russian space station Mir was readied for flight Wednesday by NASA workers who will load it aboard shuttle Atlantis. The U.S. spaceship is to ferry the 253-pound device to the outpost after its May 15 launch from Kennedy Space Center. It will serve as a backup to a troublesome unit that is supplying Mir's crew with air. The generator on Mir failed repeatedly during the past few weeks, but the station's two Russian cosmonauts got it working again last weekend. American astronaut Jerry Linenger also is living on the orbit facility. NASA scrambled to add the generator to its Mir-bound cargo, which will be transported to the station in a Spacehab module bolted in Atlantis' cargo bay. Spacehab technicians have been working long hours to figure out how to get the hefty piece of equipment inside the module. [Florida Today, April 17, 1997, p 1B.]

NASA WORKER DRIVES INTO SR 405 DITCH

A NASA employee drove into a water-filled ditch off Route 405 Wednesday morning and was rescued from his sinking car by two Kennedy Space Center employees,

according to KSC officials. The man was driving west on Route 405 past the Kennedy Space Center Visitor Center shortly before 9 a.m. Wednesday when his car veered off the road and splashed into the ditch, KSC spokesman Bruce Buckingham said. That's when two other KSC workers, Daryl Elder and Jerald Bowman, drove by and stopped to pull him out of his vehicle. The man, who was driving a government-owned car, was taken to Parrish Medical Center for treatment. The cause of the accident is under investigation. Fish and Wildlife officials also were called to the scene later to remove an alligator from the area before divers could go into the water to make sure there were no additional passengers in the car. [Florida Today, April 17, 1997, p 2B. Florida Today, Milt Salamon, April 18, 1997, p 16A.]

April 17: TWO NEW TOUR SITES NOW UNDER CONSTRUCTION AT KSC

Construction has begun on two major new tour sites for the visiting public at KSC -- a 60-foot observation gantry located in the heart of Launch Complex 39 and the International Space Station exhibit facility with will include a viewing gallery overlooking the actual Space Station processing high bay. The Launch Complex 39 Observation Gantry is being constructed alongside the crawlerway in the intersection of the turnoff to Launch Pad 39B. An enclosed, air-conditioned observation deck with a surrounding open-air walkway, providing a panoramic view of LC 39, will be located at the top level of the gantry. In the KSC Industrial Area, a facility which once support Apollo astronaut training and then housed Apollo-era exhibits is being made-over to an International Space Station exhibit with high fidelity mock-ups of the station elements that visitors will be able to wander through as they learn about why a space station is needed, how it will be constructed, how it will be used, and how it will benefit people. The high bay area of the old Flight Crew Training Facility, now designated the Engineering Development Lab, will resemble the high bay processing area of the Space Station Processing Facility across the street. Visitors will be able to walk across an elevated link between the two facilities and enter a viewing gallery on the side of the Space Station Processing Facility. Both projects are expected to be completed by year-end and are coming at a time when the KSC Visitor Center is experiencing substantial growth in attendance. The KSC Visitor Center is NASA's largest and best attended visitor facility, attracting nearly 2.5 million visitors in 1996. [KSC Countdown, April 17, 1997.]

COLUMBIA TRIES AGAIN ON JULY 1

Shuttle Columbia's recently shortened space flight will be flown again in early July, a move that will cause delays in three other shuttle missions this year, NASA officials said Thursday. In a cross-country teleconference, agency managers decided to launch Columbia again on a \$500 million flight that was cut short earlier this month after the failure of a power generator. The new launch date for the mission -- which will have the same crew and is expected to cost NASA an extra \$50 million to \$80 million - is July 1. Launching Columbia 84 days after landing , which returned to Earth on April

8 after completing four of 16 planned days in space, would set a turnaround record in the post-Challenger era. NASA, which has been more cautious about shuttle preparations since the 1986 Challenger explosion, will keep the science lab inside Columbia's cargo bay instead of removing it for refurbishment. That has never been done before. The decision to squeeze Columbia into July changes the rest of the year's launch schedule. The July 15 launch of Discovery on a 11-day space science flight until early August. The target date: August 7. The September 18 launch of shuttle Endeavour on a nine-day mission to the Mir station until late September or early October. The new target date: September 25. The October 9 launch of Columbia on a 16-day research flight until mid-November. The new target date: November 13. [Florida Today, April 18, 1997, p 1A. The Orlando Sentinel, April 18, 1997, p A-15.]

April 18:

**COMMANDER, PILOT, FLIGHT ENGINEER
TO ROUND OUT STS-90 CREW**

Richard A. Searfoss (Lt. Colonel, USAF) will command a 16-day mission to study the ability of humans to operate in microgravity environment for an extended period of time. Joining Searfoss on Columbia's flight deck will be Pilot Scott D. Altman (Lt. Commander, USN) and Mission Specialist Kathryn "Kay" Hire. STS-90 is scheduled for a March 1998 launch. They will join Richard M. Linnehan and Dafydd "Dave" Rhys Williams, MD, (Canadian Space Agency) who were named in August 1996 to support the STS-90 Neurolab mission and two Payload Specialists who will be selected closer to flight. Four candidates currently are training for selection as prime and backup payload specialist positions on STS-90. Dr. Jay C. Buckey, Dr. Alexander W. Dunlap, Dr. Chiaki Mukai and Dr. James A. Pawelczyk were named in April 1996. Two will fly on the mission with the remaining two serving as backup or alternate payload specialists ready to fly on the mission if necessary. Investigations during the Neurolab mission will focus on the effects of microgravity on the nervous system. [NASA News Release #97-74, April 18, 1997.]

EX-KSC WORKER SET FOR RIDE OF HER LIFE

For the first time since people began rocketing into orbit from the Space Coast in 1961, a former Kennedy Space Center worker is holding a ticket to ride. Former Merritt Island resident Kay Hire -- who became the first KSC employee selected for NASA's elite astronaut corps in 1994 -- got the call Friday to fly on a research mission aboard shuttle Columbia in March. The former Lockheed Space Operations Co. engineer was the first woman to serve in a Navy combat air squadron. She will serve as flight engineer on a planned 16-day flight. Hire, 37, worked for Lockheed at KSC for about five years before being selected from a pool of 2,962 applicants to join NASA's astronaut corps. Senior NASA managers said Hire's experience working in day-to-day shuttle launch operations gave her an edge in the highly competitive astronaut selection process. After a year of astronaut training at Houston, Hire spent

much of 1996 working in the NASA Mission Control Center, where she served as a capsule communicator. Two other former KSC employees were selected as astronauts last year. Joan Higginbotham and Frank Caldeiro should be eligible for shuttle flight assignments by the end of this year. [Florida Today, April 19, 1997, p 1A & 2A.]

April 20:

5 HONORED FOR SHUTTLE MISSION

Five McDonnell Douglas Space & Defense Systems-Kennedy Space Center division employees were recently named recipients of the prestigious Space Flight Awareness Honoree Award for STS-82, the space shuttle Discovery mission to repair the Hubble Space Telescope. Cliff Burket, a senior systems engineer; Wayne Derbyshire, a principal project engineer; Tom Luman, a senior operations analyst; Lynn Pemberton, a principal contract administrator; Scott Strickland, a senior design engineer. The Space Flight Awareness Award is NASA's highest tribute to government and industry workers. [Florida Today, April 20, 1997, p 4B.]

April 21:

CASSINI SHIPPED TO KSC FOR LAUNCH TO SATURN

The Cassini spacecraft was delivered from NASA's Jet Propulsion Laboratory (JPL) here to the Kennedy Space Center (KSC) on April 21, where it is scheduled for launch later this year on the start of a 6.7-year journey to Saturn. The 12,470-lb. spacecraft, designed and developed by JPL, was transported from the laboratory to nearby Edwards AFB, Calif., where it was loaded on a U.S. Air Force C-17 transport for the flight to KSC. The spacecraft now will undergo final integration and testing in preparation for launch on a USAF Titan 4B Centaur booster in October. The launch window for the program opens Oct. 6 and continues through Oct. 30. The spacecraft will fly a trajectory which will take it twice around Venus, once around Earth and once around Jupiter in order to gain the velocity required to reach Saturn. Following arrival at the planet in 2004, Cassini is scheduled to make 60 orbits of Saturn and its moons during the primary 4-year orbital mission. The arrival date of July, 2004, was selected because it presented an opportunity to fly past the moon Phoebe on the way to Saturn. After the spacecraft arrived from JPL, Cassini science instruments not currently installed on the orbiter vehicle were to be integrated on the spacecraft. In addition, a large parabolic high-gain antenna, provided by the Italian Space Agency, will be added to the spacecraft at KSC. [Aviation Week & Space Technology, April 28, 1997, p 66.]

PEGASUS XL LAUNCHES FROM CANARY ISLANDS

In its first mission undertaken outside the U.S., an Orbital Sciences Corp. Pegasus XL booster orbited a Spanish scientific satellite last week in an air launch off the Canary Islands. The Pegasus and its primary payload, the Minisat satellite, were dropped from Orbital Sciences' L-1011 aircraft at 39,000 ft. over the Atlantic Ocean on April 21. The booster subsequently fired in midair and carried Minisat to its orbit of 570 x

577 km., inclined to the equator at 151 deg. The third stage of the Pegasus also carried a tiny 2-lb. payload bearing the cremated remains of 22 people, including Star Trek creator Gene Roddenberry, V-2 rocket and Apollo program veteran Krafft Ehricke, and controversial 1960s figure Timothy Leary. The remains were launched from Celestis Inc., a Houston venture that charged \$4,800 per customer. [Aviation Week & Space Technology, April 28, 1997, p 67.]

NASA AND THE U.S. AIR FORCE

NASA and the U.S. Air Force Space Command have agreed to form seven teams to study new areas of NASA/USAF space cooperation, including the launch of TRW Defense Support Program (DSP) missile warning satellites from the space shuttle in 1999. After the 1986 shuttle Challenger accident, the Air Force transitioned large military payloads such as the 5,000-lb. DSP off the shuttle onto Titan 4 boosters, although the shuttle previously launch one DSP. The renewal of defense shuttle missions could help reduce overall government space costs, NASA and USAF believe. In addition, USAF will study the launch of more military space technology research payloads on the shuttle. Under the agreement, NASA and USAF also will coordinate efforts to study and reduce orbiting space debris, study collaboration on the Clementine 2 spacecraft project and expand cooperation in space environment research and data-sharing. [Aviation Week & Space Technology, April 21, 1997, p 18.]

AN X-33 FOLLOW-ON VEHICLE

An X-33 follow-on vehicle would be developed under the NASA authorization bill approved last week by the House Science Committee. An amendment to the bill would authorize spending \$750 million during the next two years on the vehicle. Like the X-33, it would be an experimental single-stage-to-orbit demonstrator, but it would have a different design and include more advanced technologies. KSC is a member of the NASA X-33 team. [Aviation Week & Space Technology, April 21, 1997, p 18.]

KENNEDY SPACE CENTER TECHNICIANS INSPECTING ATLANTIS

Kennedy Space Center technicians are inspecting the orbiter Atlantis to determine if the spacecraft has defects in its aft attach points for the external tank. Any defects found could delay Atlantis' launch May 15 on a critical resupply mission to the Mir space station. Inspection of the orbiters Columbia and Discovery showed deformation of bolt holes in the "pyro can" assemblies, and engineers want to see if Atlantis has the same problem. These pyrocan fixtures cover pyrotechnic devices critical for separation of the external tank after launch. [Aviation Week & Space Technology, April 21, 1997, p 18.]

WHO PAYS?

House Science Committee Chairman F. James Sensenbrenner (R.-Wis.) is promoting an alternative to NASA's plan to shift \$200 million from the space shuttle to the international space station program. The funds are required to pay for Russian-caused delays, but many in Congress are worried that the money grab could affect shuttle safety. Sensenbrenner's idea is to give NASA a supplemental appropriation for the station -- paid for out of the U.S. aid budget to Russia, instead of the shuttle budget. That way, Russia, and not U.S. taxpayers, would pay for Moscow's failure to build station hardware on time. But Vice President Al Gore and NASA chief Daniel Goldin rejected the idea outright, insisting the funds transfer won't hurt shuttle safety. NASA officials also were retreating slightly, saying they might be able to get by with just \$180 million from the shuttle program. [Aviation Week & Space Technology, April 21, 1997, p 21.]

NEW CENTERLINE LIGHTS ON KENNEDY SPACE CENTER'S SHUTTLE RUNWAY

New centerline lights on Kennedy Space Center's shuttle runway will enable the orbiter's pilots to better align with the runway late in approach and perceive any drift off the centerline. The shuttle runway was equipped with centerline lights when it was built 20 years ago, but they were removed prior to the first flight in 1981, after concern arose about the damage to the orbiter's tires if they were to strike the lights during touchdowns of 200-220 mph. New technology that allows the lights to flush with the runway surface has made reinstallation possible. [Aviation Week & Space Technology, April 21, 1997, p 60.]

NEW COMMERCIAL LAUNCH PAD READY AT CAPE CANAVERAL

On Launch Complex 46 at Cape Canaveral, stacking test are being used to help Lockheed Martin and Orbital Sciences Corp. verify the new commercial launch facility for use by LMLV and Taurus boosters. The Florida Spaceport Authority has converted the old Navy Trident missile pad for commercial use. The first mission will be launch of the NASA Ames Lunar Prospector spacecraft into orbit around the Moon. That mission, set for September, will be the first flight of the three-stage LMLV-2 booster, which uses two Castor 120 stages. Missions with the Taurus, which uses a Castor 120 first stage, could also be flown from the pad. [Aviation Week & Space Technology, April 21, 1997, p 65.]

SHUTTLE SURFEIT?

NASA has \$500-600-million surplus in its space shuttle account -- considerably more than the agency has acknowledged publicly. It's also more than enough to fix the

problems in the space station program. However, that bookkeeping bonanza won't do much to help the Clinton Administration get the \$180-200 million of shuttle money it wants to pay for the Interim Control Module and other costs associated with Russia's schedule slippage on the Service Module. As recently as early this month, NASA's party line was still that financial reserves in the shuttle program are tight and any savings from consolidating shuttle contracts should be plowed back into safety improvements and upgrades. Now NASA supporters on Capitol Hill are livid that the agency suddenly changed its tune when the station program needed cash, especially in light of the last shuttle mission being cut short due to a fuel cell problem. "Are they saving money, or are they cutting corners?" one asked. Look for Republicans to put the squeeze on Mission to Planet Earth and for the Office of Management and Budget to propose a separate NASA budget line for "Russian contingencies." [Aviation Week & Space Technology, April 28, 1997, p 19.]

April 22:

TODAY IS EARTH DAY

In recognition of Earth Day, the KSC Buy Recycled Expo will be a featured activity at the KSC Visitor Center. The Expo is intended to acquaint buyers and operations personnel with those companies which manufacture products from recycled materials. Product samples available are plastic lumber, clothing, paint, office products, toner cartridges, floor coverings, recycled tire surface coverings, compostable bags/liners and spill control products. [KSC Countdown, April 22, 1997.]

NASA CONCURS WITH INDEPENDENT REVIEW OF BION 11 MISSION

NASA is suspending its participation in primate research on the Bion 12 mission, part of an international project to study the physiological effects of low gravity and space radiation. NASA's decision is based on the recommendations of an independent review board requested by the Agency to look into the post-flight death of a rhesus monkey following the successful flight and landing of the Bion 11 satellite. The panel found that there was an unexpected mortality risk associated with anesthesia for surgical procedures (biopsy of bone and muscle) on the day following return from space. NASA has determined that this risk is unacceptable and is therefore discontinuing its participation in the primate experiments on Bion 12. [NASA News Release #97-77, April 22, 1997.]

April 23:

SPACE OFFICIALS LOBBY FOR NEW ROCKET HANGAR

Florida space officials descended on Tallahassee Wednesday to push the state to spend up to \$5 million to build a hangar for futuristic rockets to keep the space business in Central Florida. Officials hope to lure NASA to test its \$50 million reusable unmanned rocket, called X-34, at Kennedy Space Center. New Mexico and California are competitors for the business. After two initial tests in New Mexico, NASA plans

25 additional test flights of the X-34. Those flights are worth \$250,000 apiece, and NASA could fly many or most of them out of KSC if the state builds a hangar, said U.S. Rep Dave Weldon, R-Palm Bay. A hangar can be even more lucrative, said state Rep. Randy Ball, R-Titusville. Like an airport or seaport, it will lure more than just one tenant, he said. Lockheed Martin is developing in California a privately funded reusable spaceship that doesn't rely on boosters that have to be jettisoned in flight. Florida became a launch site because rocket stages could fall harmlessly into the Atlantic Ocean. Florida officials are worried because the next generation of fully reusable spaceships -- the X-34 and the Lockheed Martin ship -- don't need to launch from KSC. New Mexico and California are talking about spending tens of millions of dollars to lure space business, Ball said. Because Florida has established launch sites, it will not need to spend that much to compete, he said. [The Orlando Sentinel, April 24, 1997, p A-14.]

April 24: VOTE RALLIES NASA, SPACE STATION PLANS

Despite concerns that Russia won't pay for its share of the international space station, the House passed legislation Thursday financing NASA for two years while keeping Moscow in the family. The measure authorizes spending \$13.8 billion on NASA programs in fiscal 1998 and \$13.9 billion in fiscal 1999, a slight increase over current levels. With full financing for the space shuttle fleet and other NASA science and technology programs, the only point of contention came when Rep. Tim Roemer, D-Ind., introduced his annual amendment to kill the station. The measure was easily defeated on a 305-112 vote, extending to 16 the number of kill votes the station has survived since 1991. The legislation also includes a series of requirements designed to hold the Clinton administration, NASA and the Russian government more accountable as work on the space station proceeds. [Florida Today, April 25, 1997, p 1A.]

April 25: NASA SELECTS PHASE II SMALL BUSINESS PROJECTS

NASA has selected 14 additional research proposals for negotiation of Phase II contract awards for NASA's Small Business Innovation Research (SBIR) Program. The selected projects, which have a total value of approximately \$8.4 million, will be conducted by 13 small, high-technology firms located in nine states. These additional selections are made possible by a strategic change in the FY1997 SBIR program funding plan. Selection distribution by NASA field center included one at Kennedy Space Center: Merritt Systems, Inc., Rockledge, FL, Smart Umbilical Mating System. [NASA News Release #97-79, April 25, 1997. **Small Business Innovation Research Program** [Online]. Available Internet: <http://sbir.hq.nasa.gov/SBIR.html>.]

ATLAS 1 ROCKET LAUNCHED

An Atlas 1 rocket carrying a GOES weather satellite lifted off from Cape Canaveral

Air Station at 1:49 a.m. Friday. The \$220 million satellite will be placed on standby in space as hurricane season opens in June. The satellite provides forecasters with a backup unit should one of two weather satellites in use become disabled. [**Florida Today**, "Forecasters breathe easier," April 26, 1997, p 1B & 2B.]

REDESIGNATION OF STS-83R

On Friday, Shuttle managers officially announced that Columbia would reflly the shortened STS-83 mission in early July. The reflight mission will now be called STS-94. [**Kennedy Space Center Space Shuttle Status Report**, April 28, 1997.]

April 27: MOUNDS OFFER CLUES TO AIS INDIANS' LIVES

Behind a vacant motel in Palm Bay, a ragged trail winds a course along a shady bluff overlooking the Indian River Lagoon. Four hundred years ago, the site served as a strategic lookout for a fierce, self-sufficient people known as the Ais Indians. Today, the only vestige of this vanished society's encampment are dirt-entombed shell mounds left by long-dead warriors who feasted on the river's riches as they scouted for enemy canoes. Archaeologists, historians and community planners are taking new strides to save the historically rich Ais sites. In simplest terms, shell mounds, otherwise known as middens, are the garbage biles of antiquity, the cast off remains of oyster and clam feasts from an extinct population. But within those mounds are shards of pottery, broken arrowheads and animal bones fashioned into crude tools. As a result, they offer remnants of an era unrecorded in history. Between 150 and 200 archaeological sites -- including middens and prehistoric campfire sites -- have been recorded within the sprawling Kennedy Space Center's 140,000 acres. Another 100 sites are scattered throughout Canaveral National Seashore. Though shell mounds on federal, county and public property are protected by state law, there are no laws prohibiting their destruction on private property. KSC officials are developing a management plan to protect middens at the spaceport. [**Florida Today**, April 27, 1997, p 1A & 2A.]

April 29: SPACE CONGRESS SETS 34TH EDITION

For people who work in the aerospace industry, Cocoa Beach is the place to be this week. European rocket makers, U.S. astronauts, military pilots and others are in town for the 34th Space Congress, an annual event focusing this year on the rise of international space ventures. In addition to international ventures, conference speakers will describe a future spaceship that may replace NASA's shuttle fleet, spinoff benefits from space projects, and new rocket designs. The keynote speaker is astronaut Story Musgrave, who will talk tonight at a sold-out banquet at Port Canaveral. The 34th Space Congress begins today and extends through Friday May 2, 1997. [**Florida Today**, April 29, 1997, p 2A. **KSC Countdown**, April 29, 1997.]

EX-KSC DIRECTOR HAS NEW CAREER

Former Kennedy Space Center Director Jay Honeycutt will shuttle back to Houston next week, launching a new corporate career with aerospace industry giant Lockheed Martin. Honeycutt, who retired from NASA on Feb. 28 after nearly four decades of government service, will take on a new job Monday, serving as executive vice president of Lockheed Martin Space Mission Systems & Services in Houston. Honeycutt, 59, spent much of his NASA career at Johnson Space Center in Houston, where he worked as a flight operations engineer and shuttle program manager for 20 years. The NASA veteran came to KSC as director of shuttle management and operations in 1989 and was named center director in 1995. In his new post, Honeycutt will serve as a deputy to division president Clint Denny. His exact role and responsibilities, however, are still to be defined. [Florida Today, April 29, 1997, p 1B.]

AMERICAN, RUSSIAN TAKE WALK IN SPACE

High above the clouds of Earth, it was a sight never seen before -- an American and Russian walking, talking and laughing together in space. That's what happened Tuesday as U.S. astronaut Jerry Linenger and Russian cosmonaut Vasily Tsibliyev spent five hours spacewalking outside the Russian space station Mir. The two men hooked up science experiments and retrieved others. Their work marked the first time crews from the two nations have ventured together outside a spacecraft. It also was a precursor to more than 100 spacewalks that will be needed to construct NASA's international space station. The \$40 billion outpost is slated to be built between mid-1998 and the end of 2002 with the help of Russia, Europe, Canada and Japan. [Florida Today, April 30, 1997, p 1A & 2A.]

April 30:

MAY 15 SELECTED FOR SIXTH SHUTTLE-MIR MISSION LAUNCH

NASA managers today set May 15 as the official launch date for Space Shuttle Atlantis' sixth docking with Russia's Space Station Mir following completion of the Flight Readiness Review at Kennedy Space Center. The STS-84 launch window opens at about 4:08 a.m. EDT and extends for approximately seven minutes. The actual opening of the window may vary by a couple of minutes based on the Shuttle's rendezvous requirements and Mir's precise location in space at the time of launch. An on-time launch May 15 will result in Atlantis landing at about 7:49 a.m. EDT, Saturday, May 24 at KSC completing nine days in space. STS-84 is the sixth in a series of docking missions between the Shuttle and Mir and the third involving the exchange of American astronauts. Linenger, who has been a Mir crew member since January 15, will be replaced by Foale who then will spend more than four months on the station before returning to Earth on the STS-86 Atlantis/Mir docking mission in September. [NASA News Release #70-97, April 30, 1997.]

April 31:

**FOALE TO REPLACE LININGER ON MIR;
ATLANTIS CLEARED TO LAUNCH MAY 15**

NASA astronaut Michael Foale will spend four months on Russia's Mir despite a recent rash of problems on the orbiting space station, NASA officials said Wednesday. Shuttle Atlantis, meanwhile, was cleared to launch Foale and six other astronauts on May 15 even though NASA has yet to pinpoint the cause of a power plant failure that cut short a research mission aboard Columbia in April. The Atlantis launch date and plans for Foale's stay on Mir were firmed up during a senior NASA management meeting at KSC. [Florida Today, May 1, 1997, p 10A.]

WHO'S IN CONTROL OF SHUTTLE? YOU ARE

Soon you won't have to move to Houston to live the mission-control dream. All you'll have to do is slide a CD-ROM into your computer. United Space Alliance, the company that runs the space shuttle for NASA and staffs most of mission control, is coming out with Space Shuttle Academy, a combination mission-control computer game and shuttle virtual-reality tour guide. The CD, still in early versions, was revealed Wednesday at the 34th annual Space Congress in Cocoa Beach but won't hit the market for two more months. It'll cost \$9.95 and benefit a nonprofit space education organization. [The Orlando Sentinel, May 1, 1997, p 15A.]

MCDONNELL DOUGLAS GETS OK TO LAUNCH TWO DELTAS

The Air Force gave McDonnell Douglas approval Wednesday to launch two Delta rockets before finishing a government investigation into a January explosion that grounded the fleet. The first flight will come Friday at Vandenberg Air Force Base in California. It will be followed by another May 11 at Cape Canaveral Air Station. But neither Air Force nor company officials would say whether investigators have determined what caused a Delta solid rocket booster to split apart during a Jan. 17 launch from Cape Canaveral. [Florida Today, May 1, 1997, p 1A.]

During April:

WORK ADVANCING ON LAUNCH COMPLEX 46

Work at Cape Canaveral is advancing toward the first commercial launch from Florida Spaceport Authority's Launch Complex 46. Engineers from Thiokol Corp., Orbital Sciences and Lockheed Martin have begun practice stacking handling operations and handling operations with an inert Castor 120 solid rocket motor. The motor is like that to be used as the first two stages on the Lockheed Martin LMLV-2 booster, set to launch the Lunar Prospector spacecraft to the Moon from the facility in September. [Aviation Week & Space Technology, April 7, 1997, p 60.]

RUSSIAN MIR GROUND SPARE ACQUIRED BY ATTRACTION

One of the two ground spare Russian Mir core modules has been acquired by Tommy's Robot World, an entertainment attraction at the Wisconsin Dells. Three Mir core modules were built, the one now in orbit, a spare used for technical evaluations at Energia, and the third, which is set to arrive in Wisconsin this spring. [**Aviation Week & Space Technology**, April 7, 1997, p 60.]

ASTRONAUTS AVAILABLE ON WEB SITE

Former NASA astronauts now can be booked for speeches or other appearances via the Astronaut Connection Web site located at <http://nauts.com/index.html>. A married couple set up the site, which serves as agent for 33 retired astronauts and a Russian cosmonaut. Astronaut Connection is the first for-profit booking agency for the astronauts. [**The Brevard Technical Journal**, April 1997, p 9.]

MAY

May 1:

NATIONAL DAY OF PRAYER, 1997

The United States Congress, by Public Law 100-307, has called our citizens to reaffirm annually our dependence on Almighty God by recognizing a "National Day of Prayer." President Clinton has proclaimed May 1, 1997, as a National Day of Prayer. [Memorandum, Roy D. Bridges, Jr., April 29, 1997.]

BACKPACK CAUSES BOMB STIR AT KSC

An abandoned backpack caused NASA to bring in bomb-sniffing dogs Thursday and move employees from the east side of a Kennedy Space Center building for a short time. The bag was full of dirty gym clothes, but NASA officials took the cautious approach with the abandoned backpack, said KSC spokeswoman Lisa Malone. "We have to do this as a precaution just to check things out," Malone said. The backpack was spotted at 4:08 p.m. inside the six-story Operations and Support Building at KSC. It was found on the ground floor near the Kennedy Space Center Federal Credit Union office located inside the building. [Florida Today, May 2, 1997, p 2B.]

May 2:

REPORT: DAMAGED MOTOR LINKED TO CAUSE OF DELTA ROCKET BLAST

The explosion of a McDonnell Douglas Delta 2 booster in January was triggered because one of its solid rocket motors was damaged after it was manufactured, according to a report released Friday. The potential of a ground mishandling incident or even sabotage by gunfire were cited as "credible failure modes" that could have caused the rupture of the vehicle's No. 2 Alliant Techsystems solid motor. Air Force investigators were unable to determine exactly what caused the damage, allowing the motor to split open seven seconds after launch and destroy a \$45 million navigation satellite. They did say the damage likely occurred sometime between the motor's final testing in Utah in July 1995, and its attachment to the rocket 17 months later at the launch pad. The Jan. 17 explosion at Cape Canaveral Air Station grounded the fleet, destroyed a \$43 million defense satellite and caused \$22 million in damage to the Delta's launch complex. [Florida Today, May 3, 1997, p 4A. The Orlando Sentinel, May 3, 1997, p A-5. Aviation Week & Space Technology, May 12, 1997, p 24.]

May 3:

1ST RUSSIAN WOMAN TO FLY ON U.S. SPACESHIP

Elena Kondakova will become the first Russian woman to rocket into orbit on a U.S. spaceship this month. Kondakova is to fly aboard shuttle Atlantis on May 15 on the sixth or nine planned missions to Russia's Mir space station. The flights are designed to prepare the United States and Russia for building a new international space station between 1998 and 2002. Kondakova has previously spent 169 days in space aboard

Mir in 1994 and 1995. [Florida Today, May 3, 1997, p 1A.]

May 3-7: STUDENT WINNERS TO BE HONORED IN WASHINGTON, DC

Twenty-seven students from public and private schools across the United States have won national recognition in NASA's 17th annual Space Science Student Involvement Program competition. The students were honored along with their teachers at the National Space Science Symposium, May 3-7, at the Marriott Hotel at Metro Center, Washington, DC. In addition to their recognition in Washington, other awards include opportunities to intern at a NASA field center for a week during the summer, Space Camp scholarships, medals, ribbons and certificates. Christine Hwang, Montgomery Blair H. S., Silver Spring, MD, will intern at NASA's Kennedy Space Center and work with engineers on launch operations. [NASA News Release #97-84, April 29, 1997.]

May 4: ROCKETDYNE WINS AWARD

The maker of space shuttle main engines has captured NASA's highest award for quality and contractor performance. The Rocketdyne Division of Boeing North American Inc. won NASA's 1996 George M. Low Award for excellence and outstanding achievements in quality and performance. Based in Canoga Park, Calif., Rocketdyne was selected from a field of top performing NASA contractors for the annual award, which is named for George M. Low, former deputy administrator of NASA during the early development of the space shuttle. [Florida Today, May 4, 1997, p 14C.]

NEW IMAX FILM TO OPEN AT KSC

A new IMAX film about life on the Russian space station Mir and NASA astronaut stays aboard the outpost will premiere this month at Kennedy Space Center Visitor Center. Titled "Mission to Mir," the movie will give audiences the opportunity to experience life aboard the first permanent space station. The production will open May 20 at the Smithsonian Institution's National Air and Space Museum in Washington, D.C. Simultaneous openings will take place at the KSC Visitor Center as well as other locations in the United States and Canada. Filmed by NASA astronauts, the 40-minute giant-screen tour of Russia's Mir station escorts viewers through the weightless abode that has been occupied by international teams of scientists since 1986. Blending historical footage with live-action shots, the larger-than-life venture illustrates the personal friendship forged by the former Cold War rivals as they work together in orbit. [Florida Today, May 4, 1997, p 2B.]

May 5: SOME UNEASY WITH CASSINI'S NUCLEAR FUEL

Before it can embark this fall on a tour of Saturn and its moons, a NASA probe called Cassini first has to get past Willa Elam and others who are skeptical about the

spacecraft. The Palm Bay resident was among about 50 people who came out Monday night to learn about Cassini, its scientific plans for Saturn and, mostly, the nuclear-generated power that it will rely upon to do its job. Despite assurance from NASA that Cassini's plutonium does not pose a threat to Brevard County or the world, Elam was not feeling any better at the end of the two-hour gathering at the Cape Canaveral Public Library sponsored by the Cape Canaveral City Council. Opponents worry that a launch accident could cause the probe's plutonium to be released. NASA officials described years of safety studies behind Cassini, maintaining first that a launch accident is unlikely. If one occurs, nonetheless, they say the plutonium is encased in containers made to withstand the damage. The electricity to power Cassini's instruments and computers is produced by the decay of plutonium inside three protective containers - called radioisotope thermoelectric generators. These generators have a long history of use in U.S. spacecraft, including the lunar modules used during Apollo landings and other planetary explorers, such as the Viking probes that landed on Mars in the 1970s. Commonly called RTGs, the canisters are tested rigorously to make sure they can survive accidents and keep their plutonium encased. Once it reaches Saturn in 2004, Cassini will take a four-year tour of the giant planet, studying its atmosphere, its magnetic field, its rings and several of its moons. [Florida Today, May 6, 1997, p 1B.]

DELTA IN THE DAWN

Motorola Inc. began building a satellite network for mobile phone service Monday when a Delta II rocket was launched from Vandenberg Air Force Base in California. The Delta II booster blasted off at 7:55 a.m. PDT from the North Vandenberg launch complex for positioning in polar orbit. The successful launch followed three consecutive postponements. The launch was worth more than \$500 million to McDonnell Douglas, which builds the Delta. It was the first commercial launch from Vandenberg and the first Delta launch since one exploded Jan. 17 at Cape Canaveral Air Force Station. [The Orlando Sentinel, May 6, 1997, p A-1.]

May 6:

KSC TEAM HONORED FOR X-33 ENVIRONMENTAL IMPACT EFFORTS

A team from Kennedy Space Center has been recognized by Marshall Space Flight Center, Huntsville, AL, for supporting the X-33 environmental impact effort. Mario Busacca, Gail King, Barbara Naylor and Dave Barker helped prepare the Environmental Impact Assessment (EIA) issued in June 1996. They are still supporting work on the Environmental Impact Statement to be released in June of this year. Both documents are mandatory federal requirements that must be completed before NASA makes final selection on the location of the launch site at Edwards Air Force Base, CA, and landing sites throughout the Western United States. Rebecca C. McCaleb, director, Environmental Engineering and Management Office, MSFC, called the KSC team "a model for cooperation in the Agency." KSC and other X-33

environmental experts traveled to various sites, studied the area and prepared for 12 public meetings to discuss the X-33 program. KSC was asked to participate because of its expertise in environmental aspects of launch and landing operations. KSC expertise is also assisting the X-33 program by engineering and testing specific launch elements. "KSC is designing the umbilicals and holddown posts for the launch site at Edwards," said KSC's Deputy Engineering Development Director Warren Wiley. KSC is also designing vehicle positioning and handling equipment, assisting in the areas of hazardous gas detection systems, and supporting the X-33 program on the West Coast in a variety of additional consultant roles. [KSC Countdown, May 6, 1997.]

SPACE STATION IS 'BACK ON TRACK,' GOLDIN SAYS

NASA administrator Dan Goldin assured a panel of senators Tuesday that so far "we're back on track," with the Russian government appearing to be as committed as ever to the International Space Station. However, the space agency is proceeding with plans to build a U.S. module to compensate for a tardy Russian component that would give the orbiting science platform the ability to maintain a constant orbit and provide a habitat for astronauts. Goldin also informed the panel that NASA is closely monitoring the health of the current Russian space station Mir, where U.S. astronauts have been living and working for more than a year. The aging Russian spaceship has had a series of mechanical failures, including a fire. [Florida Today, May 7, 1997, p 4A.]

OFFICIALS DELAY DELTA LAUNCH UNTIL MAY 17

The planned launch Sunday of a McDonnell Douglas Delta rocket from Cape Canaveral Air Station has been postponed until May 17 so engineers can review unusual fuel consumption on a flight earlier this week. Launched Monday from Vandenberg Air Force Base, a Delta rocket's second stage engine guzzled more rocket fuel than had been expected on the flight, company spokeswoman Christine Nelson said Tuesday. With data still being returned from rocket tracking stations around the work, Nelson said the review will not be completed in time to launch another Delta on a satellite-delivery mission from Cape Canaveral on Sunday. The rescheduled May 17 launch date could be pushed back if the planned May 15 launch of NASA's shuttle Atlantis from Kennedy Space Center is delayed, officials said. [Florida Today, May 7, 1997, p 4A.]

May 7: ORGANIZATIONAL CHANGE AND REASSIGNMENTS

Effective immediately, the Checkout and Launch Control System (CLCS) Project Office will be realigned from the Design Engineering directorate and report directly to the Center Director. In addition to developing a replacement for the existing Launch Processing System, this project will also produce an adaptable operations and control platform that will support future launch vehicle operations. [Memorandum, Roy D.

Bridges, Jr., May 7, 1997.]

HEROIC ASTRONAUTS LEFT OUT OF TRIBUTE

For three years Roger Chaffee drew a NASA paycheck as an astronaut. Then in January 1967, he died with Gus Grissom and Ed White when a fire flashed through their Apollo 1 capsule during a countdown test. Their names grace the black granite Astronaut Memorial at Kennedy Space Center. But Chaffee won't be inducted into the U.S. Astronaut Hall of Fame, a museum that stands just outside Kennedy Space Center's fence. The reason: He never flew into space. The issue of who qualifies as an astronaut sparked angry debate Saturday in Orlando at a meeting of the Astronaut Scholarship Foundation board. The nonprofit foundation, which helps run the private Hall of Fame, is adding Apollo astronauts to the museum, and its board invoked a rule that requires a flight in space to be inducted. The Hall of Fame will add a display memorializing the Apollo 1 fire and displaying the crew members' spacesuits. Chaffee's crew mates Grissom and White, who had flown into space before, are in the Hall of Fame. The Hall of Fame is run by the scholarship foundation, which was founded by ex-astronauts, and the nonprofit U.S. Space Camp. The seven-year-old museum plans a \$4 million expansion in October to include Apollo astronauts who reached space. [The Orlando Sentinel, May 7, 1997, p A-1 & A-14.]

May 8:

KSC WORKER EARNS AWARD FOR TOP TREATMENT OF TOURISTS

Capping a week of local events celebrating National Tourism Week, the Brevard Tourist Development Council and Brevard Council of Chambers had its annual awards luncheon at Port Canaveral to honor the best of the county's hotel clerks, waitresses and other unsung heroes in its efforts to boost tourism in the area. Noah Taylor, hospitality specialist at Kennedy Space Center Visitor Center was the winner of the 1997 Hospitality Specialist of the Year Award. Twelve other hospitality industry employees were nominated for the award, which this year came with a two-day, all-expenses-paid trip to Key West. [Florida Today, May 9, 1997, p 12C.]

ARMSTRONG RECALLS WALKING ON THE MOON

It was a rare public appearance for 66-year-old Neil Armstrong, the first human to set foot on the lunar surface. He shared memories, explained space hardware in detail only a rocket scientist could fully appreciate and displayed a subtle wit during a panel discussion with four other lunar explorers at the National Museum of Naval Aviation's annual symposium Thursday. Armstrong elaborated on what it was like nearly 27 years ago to take what he had proclaimed to be "one small step for a man, one giant leap for mankind" on July 20, 1969. "The first sense of feeling what the moon is like is immediately after touchdown," Armstrong said. "Now you are in the lunar gravity. The forces you feel on your feet are those that you will feel all the time when you are

on the surface and it's a particularly enjoyable time. You feel very light. It's wonderful." Armstrong said the most difficult part of the flight was the descent from lunar orbit to the moon's surface. "The higher the orbit is, the more fuel you'll need to get down," he said. "The lower the orbit, the more the possibility is you'll make a new crater and they'll name it after you. So we picked kind of a middle ground." Armstrong shared credit for being first on the moon with everyone in the space program. [Florida Today, May 11, 1997, p 6B.]

May 9: 'CAPE' CRUSADERS, NO FREE LAUNCH

After tonight's season finale of "The Cape," the syndicated show will go into rerun heaven - at least for the summer. Although it has been a hit in the Central Florida market, MTM Productions did not renew the show for a second season. Nationwide ratings did not support the high cost of production - about \$1 million an episode. The program revolves around the space program at Kennedy Space Center, and the personal and professional lives of the astronauts, astronaut candidates and NASA employees. [Florida Today, May 9 1997, p 3D.]

May 11: PILOT ON COURSE TO LAND ANOTHER MILESTONE

The first time Eileen Collins went into space, she got within 37 feet of the Russian space station Mir when shuttle Discovery rendezvoused with the outpost. The mission marked a pair of milestones: Collins became the first woman to pilot a shuttle, and NASA kicked off the start of U.S. flights to the laboratory. Collins is scheduled to fly to Mir again aboard shuttle Atlantis. The ship is to dock with the station, putting her closer to another milestone: She'll be in line to become America's first woman shuttle commander. The honor usually occurs after a shuttle pilot has flown twice. But the Air Force lieutenant colonel said she is not thinking about the coveted role as she gets ready for liftoff. "I'm just 100 percent focused on this mission," Collins said. Although Collins doesn't like to talk about her likely ascension to a commander's spot, those who know her say she would do an outstanding job. During Atlantis' flight, Collins will assist Precourt, who will fly the shuttle, by watching over the spaceship's systems during launch and landing. [Florida Today, May 12, 1997, p 1A-2A.]

LAUNCH COUNTDOWN UNDERWAY FOR STS-84 MISSION

The countdown for launch of the space shuttle Atlantis on the sixth mission to dock with Russia's space station Mir, began Sunday night, May 11 at 11 p.m. at the T-43 hour mark. The countdown includes 34 hours and seven minutes of built-in hold time leading to the opening of the launch window at about 4:08 a.m. on Thursday, May 15. The launch window extends for about 7 minutes. The exact time of launch will be determined about 90 minutes before liftoff based on the location of the Mir space station. STS-84 is the fourth space shuttle mission of 1997. This will be the 19th flight of the orbiter Atlantis and the 84th flight overall in NASA's space shuttle

program. Atlantis will carry into orbit a seven member crew including Mission Specialist Michael Foale who will replace Jerry Linenger on the Mir space station. Linenger will return to Earth with the rest of the STS-84 crew. Foale will remain on Mir until Atlantis again docks with the space station in September. The other members of the multi-national STS-84 crew are: Commander Charles Precourt, Pilot Eileen Collins, and Mission Specialists Jean-Francois Clervoy, Carlos Noriega, Edward Lu and Elena Kondakova. [KSC Countdown, May 13, 1997.]

May 13: ASTRONAUT LU TO CARRY OLYMPIC GOLD MEDAL

Astronaut Ed Lu, a collegiate wrestler and friend of Olympic wrestler David Schultz, agreed to take the Olympian's gold medal on the space shuttle Atlantis, which is set to launch Thursday (May 15). Schultz was killed in January 1996 by chemicals heir John du Pont. ["Du Pont ordered to serve 13 to 30 years for killing," The Orlando Sentinel, May 14, 1997, p A-3.]

**May 14: SPACE STATION CREW TO BREATHE EASIER
WHEN ATLANTIS BRINGS OXYGEN MACHINE**

Although the space shuttle Atlantis has docked with the Russian space station Mir five times before, this time its deliveries are more urgent. With a launch scheduled for 4:08 a.m. Thursday (May 15), Atlantis is about to haul nearly 2 tons of supplies and equipment to Mir, including vital oxygen generator. Atlantis is set to dock with Mir on Friday at 10:38 p.m. Astronaut Michael Foale will move into Mir for four months and replace Jerry Linenger. Atlantis will bring basic supplies such as air to breathe and a repairman. Last February, there was a fire on Mir. Then in March, the main oxygen generating system broke down. A back-up system wasn't working either. The main system has since been repaired, but Mir still needs a reliable backup. So Russia shipped a new oxygen generator, which is about the size of a home water-heater, to Kennedy Space Center so it could be carted to Mir aboard Atlantis. It's this type of help from the Americans that is keeping the 11-year-old Mir alive, said Valery Ryumin, shuttle-Mir director for Russia. "Every single flight is almost critical," Ryumin said. In addition to the oxygen generator, Atlantis will bring repair kits containing "hoses, clamps, caps and whatever they need to repair tubing," said NASA shuttle-Mir director Frank Culbertson. The shuttle also will bring air-quality monitors that will check for carbon monoxide and toxic chemicals leaking from the cooling system, he said. Foale was especially trained to repair Mir's crotchety life support. Overall, Atlantis is hauling 3,724 pounds of materials to Mir, a NASA record, and taking back 2,554 pounds. [The Orlando Sentinel, May 14, 1997, p A-1 & A-4.]

BIENNIAL ASTRONAUT SELECTION PROCESS BEGINS

NASA is accepting applications for mission specialist and pilot astronauts for the current selection cycle. Interested individuals may apply until the cut-off date of July

1, 1997. [NASA News Release #97-97, May 14, 1997.]

SPACE MIRROR CONTRACT REFLECTS TITUSVILLE FIRMS SUCCESS

BAMSI, Inc., has been selected to provide maintenance and operational support for the "Space Mirror" Memorial and all the other state-of-the-art facilities operated by the Astronauts' Memorial Foundation. [Florida Today, May 14, 1997, p 10C.]

SHUTTLE COLUMBIA COULD TAKE ADVERTISING TO NEW HEIGHTS

The space shuttle Columbia soon may go commercial, complete with auto racing-type ads on the outside and cargo space for rent on the inside. United Space Alliance, the private company that has run the space shuttle for the past six months, hopes next year to start marketing space for rent on Columbia, chief operating officer Jim Adamson told reporters Wednesday. Space alliance officials are looking at future commercial shuttle opportunities for Columbia, NASA's oldest orbiter. The private flights envisioned for Columbia could start as early as 1999 or 2000, Adamson said Wednesday. NASA is trying to find other uses for Columbia, which is too heavy to reach the orbit necessary to help with the agency's planned international space station. The other three shuttles will be used almost exclusively to haul people and equipment to the station during its construction. Adamson hopes to get companies to pay the space alliance to launch satellites from Columbia, something now prohibited for any shuttle by a presidential order signed in the wake of the 1986 Challenger explosion. The company is planning to ask President Clinton to rescind that order. The space alliance was hired to cut shuttle costs and split the savings with NASA. If the company can get per-launch costs low enough then it could attract more private businesses to use Columbia, Adamson said. It now costs about \$442 million per launch. [The Orlando Sentinel, May 15, 1997, p A-14.]

SCHEDULE RETOOLED FOR SPACE STATION

Top space officials from around the world met at Kennedy Space Center on Wednesday to smooth out problems with Russian participation in the space station project and approve a new schedule for the oft-delayed work. Because of financial problems, Russia is far behind in building a crucial service module. The module will provide living quarters for astronauts and flight control for the station during initial assembly. NASA officials would not comment Wednesday on the closed-door Space Station Control Board meeting. Wednesday's meeting came after one-on-one meetings earlier this week between NASA, the lead partner in the program, and each individual space agency: Russia, Japan, Canada and the European Space Agency. NASA is continuing with plans to build a \$200 million stopgap module in case Russia is unable to complete the service module in time, NASA spokesman James Hartsfield

said. Sources said the Russian role in building the space station will continue because Russia has finally found money to build the service module. [The Orlando Sentinel, May 15, 1997, p A-14.]

NASA TO CUT 150 JOBS AT TWO CENTERS

About 70 jobs will be cut at Kennedy Space Center this year as NASA continues turning over shuttle operations to a private company, officials said Wednesday. The reductions will be made within the ranks of the 5,000 United Space Alliance workers at the spaceport. Another 80 jobs will be cut at the Johnson Space Center in Houston, said Glynn Lunney, USA program manager. However, few people are expected to be laid off. Rather, the reductions will be made through attrition and moving workers to new jobs, said Mike McCulley, USA vice president and ground operations director. "There's not going to be 70 people going out the door with a pink slip," McCulley said. Since the unprecedented transition began last October as part of NASA's restructuring, the company has made significant progress, said Paul Smith, USA president and chief executive officer. A joint venture of Boeing and Lockheed Martin, USA eventually will handle day-to-day shuttle operations as NASA backs out of the work to move to increased efficiency and save money. Also, officials are still debating where to send shuttles for major overhauls. The work is now done at a Boeing plant in Palmdale, Calif., but critics contend it would be cheaper to do it at KSC. A report by NASA's Inspector General has estimated the agency could save \$30 million a year if the maintenance was done in Florida. USA plans to make a recommendation on the issue to NASA in July, said Howard DeCastro, USA deputy program manager. [Florida Today, May 15, 1997, p 7A.]

REPORT: RUSSIA CONSIDERS MILITARY USE FOR STATION

Russia is looking into military uses for a new international space station, even though it is behind schedule in building a module necessary to put the station in orbit, a newspaper reported Wednesday. The Russian government ordered its negotiators last month to seek a letter of intent with U.S. officials "on a possibility for Russia and the United States to use their own modules of the station in the interests of national security," *Nezavisimaya Gazeta* newspaper said in a front-page report. It gave no further details on the issues of national security, but the paper said Russians and Americans are planning to hold talks on the station's military uses without consulting their "junior" partners from the European Space Agency, Canada and Japan. More than a dozen countries are participating in the project to build the station, which will be big enough for six people when completed in 2002. Russian Space Agency spokesman Anatoly Tkachev refused to comment on the report. [Florida Today, May 15, 1997, p 7A.]

STS-84 COUNTDOWN STATUS

The countdown for launch of Atlantis on mission STS-84 continues on schedule today. Launch remains set for Thursday, May 15. Current indications show the 7-minute window opening at 4:07:48 a.m. EDT and closing at 4:14:47 a.m. EDT. The exact launch time will be announced about 90 minutes prior to launch following final computation of the location of the Mir space station. This morning the orbiter's communication systems and inertial measurement units were activated and safety personnel performed a debris walkdown at the pad. Also, at about 10 a.m. the rotating service structure began its move into the park position. Loading of the external tank with cryogenic propellants is scheduled to begin at about 7 p.m. tonight. Prior to loading operations, the Mission Management Team will meet at about 6 p.m. today to discuss tomorrow's launch weather and any technical issues that may arise. Early this morning, Shuttle test directors indicated possible concerns with data received from a master events controller (MEC) on the orbiter. The MEC sends electronic commands to Atlantis' onboard pyrotechnic devices. Further testing revealed the MEC to be in working order and ready for flight. Also, standard work on the orbiter maneuvering system thrusters revealed moisture in one of the thruster chambers. Technicians performed work necessary to dry the chamber and inspections of the other thrusters showed no moisture. At this time there are no outstanding issues known that would preclude a launch attempt tomorrow. Weather forecasters are currently indicating a 20 percent probability of weather prohibiting launch on Thursday. The temperature at the pad at the time of launch is expected to be about 69 degrees; relative humidity about 78 percent; clouds scattered at 5,000 and 25,000 feet; pad winds from the west at 7 knots; and no precipitation is forecasted. The 24-hour delay forecast indicates only a 20 percent chance of violation. [Bruce Buckingham. (1997). **Kennedy Space Center Space Shuttle Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe/shuttle-status [1997, May 14]

May 15:

SHUTTLE HEADING FOR DATE WITH MIR

The countdown for launch of Atlantis on mission STS-84 proceeded smoothly and launch occurred on time at 4:07:48 a.m. Atlantis is scheduled to remain on orbit for 9 days and land back at KSC on May 24 at about 7:53 a.m. Returning with Atlantis will be Jerry Linenger, who has been aboard the Russian space station Mir since mid-January. The solid rocket booster retrieval ships began recovery operations at about 6 a.m. today and are expected to return to Hangar AF with boosters in tow tomorrow afternoon. The crew of STS-84 are: Commander Charles Precourt, Pilot Eileen Collins and Mission Specialists Jean-Francois Clervoy, Carlos Noriega, Edward Lu, Elena Kondakova, Michael Foale (up) and Jerry Linenger (down). [Bruce Buckingham. (1997). **Kennedy Space Center Space Shuttle Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe/shuttle-status [1997, May 15].]

May 17:

DELTA LAUNCH RESCHEDULED

The planned Saturday liftoff of a Delta 2 rocket carrying a communications satellite is postponed to Sunday (May 18) because of delays in ground work. The rocket will have two opportunities to fly from Cape Canaveral Air Station: 6:36 to 7:23 p.m., and 8:54 to 9:45 p.m. [Florida Today, May 14, 1997, p 2A.]

May 19:

ASTRONAUT HALL OF FAME CHANGES INDUCTION RULE

In a swift about-face, a private foundation reversed a policy Monday that would have barred astronauts who died in the line of duty, but never flew in space, from induction in the U.S. Astronaut hall of Fame. The switch, which came in the wake of a public outcry, drew applause from surviving family members of fallen astronauts who would otherwise have been left out of the hall. A flap erupted earlier this month when the board of directors of the Astronaut Scholarship Foundation, a nonprofit organization that helps run the private Hall of Fame, voted to keep in place a long standing induction policy. The policy said an astronaut had to have flown in space to be considered for induction in the Hall of Fame, which is just west Kennedy Space Center. The new rule, however, specifies that an astronaut may be selected for induction if he or she "has made a significant contribution to the space program." With the new rule, astronaut Roger Chaffee, who died in a January 1967 launch pad blaze in the Apollo 1 spacecraft, will be inducted, along with other Apollo-era astronauts. [Florida Today, May 20, 1997, p 2A.]

May 20:

IMAX TO DOCUMENT SPACE STATION ASSEMBLY IN 3-D

The historic, on-orbit construction of the International Space Station will be documented in 3-D by the Imax Corporation in a large-format (70-mm) feature film to be seen around the world. This will be the first 70-mm space film to be captured in 3-D, a breakthrough made possible by Imax's current development of a 3-D movie camera that will meet the exacting requirements and strict limitations of flying on spacecraft. The film also will be distributed in Imax's 2-D format. [NASA News Release #97-104, May 20, 1997.]

DELTA SUCCESSFULLY DROPS THOR II INTO ORBIT

A Delta rocket thundered into space Tuesday, carrying a Norwegian TV satellite into orbit in the first Florida flight of the launch vehicle since a January accident. The \$150 million mission started with a 6:39 p.m. liftoff from Cape Canaveral Air Station, sending the Delta on a high arc over the Atlantic Ocean. About an hour later, the rocket dropped the Thor II communications satellite into orbit. The spacecraft will provide television service for 1 million viewers in Norway, Sweden, Denmark and Finland. The launch also inaugurated a new \$45 million Delta launch control center to replace the blockhouse abandoned after the Jan. 17 low-altitude explosion. The

facility, designated the 1st Space Launch Sqdn. Operations Bldg., is located 2.5 miles from the pad out of the blast danger area. It was placed in operation for Delta launches 4-6 months ahead of schedule because of safety concerns raised about the 40 year-old Delta Complex 17 blockhouse. The new building has fiberoptic data lines to Complex 17 and has been in planning for several years. [Florida Today, May 21, 1997, p 2A. Aviation Week & Space Technology, May 26, 1997, p 35-36.]

May 21:

'GREAT ADVENTURE' ENDS FOR ASTRONAUT

Jerry Linenger's "adventure" on the Russian space station Mir is finally over. The space shuttle Atlantis, with Linenger ensconced inside, inched away from the Russian outpost late Wednesday. For the sixth straight time, Atlantis was able to safely separate itself from Mir, Linenger's home for the past four months. During Linenger's stay on the Russian station, a fire broke out, clogging one room with smoke. Later an oxygen generator broke down and a cooling system leaked, spraying antifreeze into the air and causing temperatures to soar. After transferring more than 6,500 pounds of equipment between the two ships, Atlantis' crew will take a day off today and then start preparing for Saturday's 7:53 a.m. landing at Kennedy Space Center. [The Orlando Sentinel, May 22, 1997, p A-12.]

AMERICAN ASTRONAUT WILL LEAD FIRST SPACE STATION CREW IN '99

NASA's planned international space station remains nameless and might be boozeless, but a flap over whether the first commander of the outpost will be an American or a Russian has been resolved. That was the word Wednesday from a three-man crew that is scheduled to open the station for business in January 1999. Veteran U.S. astronaut William Shepherd will be the first station commander, and that's just fine with his Russian crewmates, Sergei Krikalev and Yuri Gidzenko. "We are not working for an American commander. We are working for the space program. Everyone will have a job to do," said Krikalev, who has logged 15 months in orbit aboard Russia's space station Mir and NASA's shuttle Discovery. Shepherd and Krikalev have been training for their five-month flight since November 1995. Russian cosmonaut Anatoli Solovyev was to be the third crew member, but refused to take part in the flight because an American was selected as mission commander. A joint project of the United States, Russia, Europe, Japan and Canada, the \$40 billion station is to be raised during a five-year construction effort that is set to begin in June 1998. The outpost largely will be of Russian origin when the first crew arrives on a Russian rocket. At that point, it will consist of a Russian command center, a Russian space tug and a U.S. docking module. Once complete, the 440-ton station will be a cluster of international laboratories and dormitories that will cover an area nearly as large as two football fields. Still up in the air is an official name for the station. [Florida Today, May 22, 1997, p 4A.]

PREMIERE OF IMAX FILM 'MISSION TO MIR'

Hundreds of Space Coast invitees gathered for the final countdown of "Mission to Mir," the new IMAX film, at a private reception held to celebrate the film's premiere at Kennedy Space Center's Visitor Center last Wednesday night. "Mission to Mir" will provide Earth bound audiences with an opportunity to soar in space and experience life aboard the first long-term space station. Filmed in space by the astronauts, the unprecedented 40-minute giant screen tour of Russia's space station Mir gives viewers a unique look inside the weightless home in space that has been occupied by teams of scientists since 1986. The new film replaces "Destiny In Space" in the Galaxy Theater complex at the Visitor Center. [Florida Today, May 27, 1997, p 2D.]

May 22:

BOPP OF COMET FAME TO BE AT KSC

Thomas Bopp will be at Kennedy Space Center as part of a five-day Space Week celebration. The events start today, which has been declared Space Day. Bopp will meet with the public and discuss the comet during three free lectures on Sunday (May 25). He will join a parade of astronauts and scientists at the Visitor Center through Memorial Day weekend. Former astronaut Norm Thagard will get things started this afternoon with a discussion of his Mir visit two years ago. He was the first American to spend time on the outpost. He will give his talk in the Visitor Center's IMAX Theater following the 1:30 p.m. premiere of a new IMAX movie, "Mission to Mir." Other speakers include: Skylab astronaut Edward Gibson; Scott Carpenter, one of the original Mercury 7 astronauts; Gene Cernan, the last man to walk on the moon; Wally Schirra, who flew in the Mercury, Gemini and Apollo programs. [Florida Today, May 22, 1997, p 1B.]

May 23:

ASTRONAUTS HONORED ON SPACE WALK

Astronaut Scott Carpenter slowly rolled back the blue velvet cloth Friday evening to reveal a granite replica of his mission patch, dated May 24, 1962, which had been inlaid into the U.S. Space Walk of Fame. Friday marked the opening ceremony for the second Mercury reunion, organized by the U. S. Space Walk of Fame Foundation for the workers and contractors who helped launch America's first manned rockets into space. Carpenter was the only astronaut of the seven Mercury astronauts present to unveil the mission patches. [Florida Today, May 24, 1997, p 1B.]

May 24:

SHUTTLE ATLANTIS RETURNS TO KSC

The space shuttle Atlantis landed safely today at KSC's Shuttle Landing Facility on Runway 33 at 9:28 a.m. Mission managers gave Atlantis' Commander Charles Precourt the go ahead for deorbit burn about 90 minutes earlier after having waved off the first KSC landing opportunity due to low clouds. Atlantis traveled 3.6 million

miles during its mission that lasted 9 days and 5 hours. Landing occurred on orbit 144. After KSC ground crew complete safing activities and Spacehab personnel complete their post flight activities, Atlantis will be transported to Orbiter Processing Facility bay 3. The crew of STS-84: Commander Charles Precourt, Pilot Eileen Collins and Mission Specialists Jean-Francois Clervoy, Carlos Noriega, Edward Lu, Elena Kondakova, Michael Foale (up) and Jerry Linenger (down). [Bruce Buckingham. (1997). **Kennedy Space Center Space Shuttle Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe/shuttle-status [1997, May 24.]

MIR ASTRONAUT GLAD TO BE DOWN TO EARTH

Jerry Linenger was away for four harrowing months on the rickety Russian space station Mir, and as he returned to Earth Sunday on space shuttle Atlantis, his 18-month-old son, John, was expecting goodies. His wife, Kathryn, was just expecting, she's due to give birth in three weeks. Linenger was walking around and healthy, probably in the best condition of any of NASA's four astronauts who have lived on Mir, officials said. But he still needed help when it came to the age-old question: Daddy, what did you bring me? "He couldn't go to a store in space," NASA Administrator Dan Goldin explained. So Linenger e-mailed NASA's top official last week and asked Goldin to do some personal shopping. That created a strange scene minutes after the space shuttle Atlantis landed safely at Kennedy Space Center at 9:27 a.m. NASA's top boss walked to the shuttle area carrying yellow and purple tulips, a teddy bear (wearing a NASA sweater) and a rattle. Linenger took the presents and gave them to his wife, son and yet-to-be-born baby. No charge. "This is a special present from me to him," Goldin said. "He's a man of courage." Linenger weathered a fire, a breakdown of an oxygen generator and an overheated cooling system on the 11-year-old Mir during his four months, the most problem prone time in the history of the Russian station. Returning to Earth Saturday morning, Linenger couldn't contain himself. "He yelled when we did the de-orbit burn (which commits Atlantis to landing). He yelled a couple times on the way down," crewmate Carlos Noriega recalled. [**The Orlando Sentinel**, May 25, 1997, p A-9.]

May 25:

PEACE COALITION: STOP CASSINI LAUNCH

On Saturday, New York author and professor Karl Grossman was the keynote speaker at a statewide meeting of the Florida Coalition for Peace & Justice. Nearly 100 members of the group, meeting at International Brotherhood of Electrical Workers union hall in Orlando, spent the day discussing how to prevent the October launch of a plutonium-powered Cassini space probe to Saturn. Coalition members and Grossman say the launch is a recipe for disaster. If the Titan IV-B rocket carrying the probe exploded, or if Cassini disintegrated inside the Earth's atmosphere, the radioactive element could rain down, harming people and wildlife, members say. Members spent part of Saturday discussing strategies to prevent the National Aeronautics and Space Administration from completing the launch. Invading the launch pad on sea kayaks

was among the suggestions. Meanwhile, the group has several "Cancel Cassini" protests planned at Cape Canaveral Air Station. The next is June 14. The coalition also is fighting the Cassini launch by lobbying Congress and through a postcard campaign to President Clinton. [The Orlando Sentinel, May 25, 1997, p A-9.]

May 26:

**SPACE CENTER'S 20-YEAR-OLD COMPUTERS
WILL BE LAUNCHED - INTO THE DUST BIN**

Kennedy Space Center, usually known for its shuttles and rockets, has launched a different high-tech project -- the most expensive computer upgrade in its history. The space center and its contractors recently reached the first milestone of a five-year, \$170 million job to replace the shuttle's checkout and launch system with new technology. Joining KSC on the project are shuttle operator United Space Alliance, Lockheed Martin Corp.'s Houston division and I-Net Engineering's KSC division. The first major step was to set up an experimental control room where new computers can be installed and personnel trained in the technology, KSC said. KSC expects to adopt the new shuttle checkout and launch system by September 2001 without interrupting shuttle missions. The current launch-control computers, which date back to the early 1970s, are lagging the times, KSC officials said. Most new home computers, for example, have 16 megabytes of random access memory, 250 times more than KSC's computers. "The current launch processing system is getting old and needs to be updated," Bruce Buckingham said. "Certainly this is the largest conversion of this type that we've had at KSC." [The Orlando Sentinel, May 26, 1997, CFB, May 26-June 1, 1997 p 4.]

KSC TO SHARE 'BREATHTAKING' VIEW

To get a bird's-eye view of Kennedy Space Center's twin space shuttle launch pads or to watch as workers ready parts of NASA's planned \$40 billion international space station will soon be possible. Residents and tourists will have the opportunity to do both at two new tour sites under construction at the home port of NASA's four orbiter shuttle fleet. The attractions, scheduled to be completed by late this year, are part of a \$14 million effort aimed at giving the public an up-close look at the nation's space shuttle and space station programs. A 60-foot observation tower being raised a half-mile from shuttle launch pad 39A will offer visitors an unprecedented view of the space center. From an enclosed, air-conditioned observation deck or a surrounding open-air walkway, visitors will have a panoramic view of pads 39A and 39B, the 52-story Vehicle Assembly Building and the NASA Launch Control Center. The two sites are being privately financed by Delaware North Parks Services of Spaceport Inc., the concessionaire that operates the Visitor Center. [Florida Today, May 26, 1997, p 1B.]

May 28:

CREW CONTINUES REPAIRS TO MIR

The crew of Russia's space station Mir is making headway on the last technical problem that has plagued their home the past few months. The two Russian cosmonauts and U.S. astronaut Mike Foale were monitoring a patched-up cooling system Wednesday to find out whether leaks have been repaired, NASA spokesman Rob Navias said. If the fix works, Mir finally will be free of a string of troubles that have hit the station since a February fire. The crew could then install a new oxygen generation system that was delivered to Mir last week by the crew of shuttle Atlantis. [Florida Today, May 29, 1997, p 2A.]

May 29:

**COMMERCIAL LAUNCH PAD FOR RENT:
\$300,000 A POP**

Spaceport Florida Authority on Thursday opened a new launch complex that officials say will strengthen the area's role in the highly competitive world of space commercialization. The Cape Canaveral Air Station site, called Complex 46, stands ready to launch small rockets and their satellites. "This is, indeed, a very special day for America's space program," said Col. Ron Larivee, vice commander of the 45th Space Wing at Patrick Air Force Base. Formerly a dormant Navy test site for Trident 2 missiles, the complex could see four to eight launches a year carrying a variety of science or commercial spacecraft, including those for cellular phone services. So far, it has two launches scheduled for its new facility. The first is set for Sept. 24, when a new, small Lockheed Martin rocket is to carry a NASA probe on a reconnaissance mission to the moon. Another version of the Lockheed Martin rocket is to carry a Chinese science satellite into orbit in the spring of 1998. [Florida Today, May 30, 1997, p 1A.]

May 31:

NASA OFFERS BUSINESSES HIGH-TECH ASSISTANCE

Economic development gurus from across the state will spend two days in Brevard County in mid-June to learn how space-age technology can benefit earth-bound businesses in their districts. At the 1997 NASA-Kennedy Space Center Technology Outreach Program Workshop on June 18 and 19, representatives from most of Florida's 67 counties will study the program that pairs NASA scientists and engineers with manufacturing and computer technology companies. Through the free program, NASA, which arguably has the most expansive research facilities on Earth, attempts to solve technical problems solicited from Florida businesses. [Florida Today, May 31, 1997, p 8C.]

During May: KSC SIGNS SPACE ACT AGREEMENT WITH SIKA CORP.

A nonreimbursable Space Act Agreement between Kennedy Space Center and the New Jersey company Sika Corporation has been signed by KSC Director Jay Honeycutt,

with the goal of a better method of inhibiting concrete rebar corrosion. The Sika Ferrogard Test Program is to determine the company's Concrete Migratory Inhibitor's ability to "inhibit corrosion of steel rebar placed within two inches of the concrete surface and to enhance the physical properties of Portland cement." A further purpose, the agreement states, "is to combine the NASA/UCF electrical injection method of inhibitors with the Sika Ferrogard properties in order to increase both systems' abilities." NASA employee Rupert Lee, with the Logistics Operations Directorate (LO), has been designated as KSC's key official for this test. Urs Hussy will represent the Lyndhurst, New Jersey-based Sika Corporation. [Technovation, Spring 1997, p 1.]

ROSS AND RUSSIA

The National Air and Space Museum opened a major exhibit last week on the "Space Race" with Russia. Eleven of the Soviet-era artifacts, including a recon film return capsule from a Salyut space station in the 1970s, the Soyuz TM-10 descent module and a Russian space suit for use on the Moon, were purchased at a 1993 auction by an anonymous collection. That collector revealed himself -- Texas billionaire and two-time presidential candidate Ross Perot. [Aviation Week & Space Technology, May 19, 1997, p 19.]

KSC AND NAVY SIGN NEW TECHNOLOGY AGREEMENT

A five-year Interagency Agreement involving corrosion technology has been signed by the U.S. Naval Research Laboratory (NRL) and Kennedy Space Center, according to Technology Programs and Commercialization Office (DE-TPO) spokesman Bruce Larsen. The agreement allows NRL's Key West facility and KSC's Materials Science Division (MSD) to collaborate on technology development and transfer in the areas of corrosion science and corrosion control. NASA Materials Specialist Louis MacDowell, Logistics Operations Directorate (LO), is leading the KSC effort. [Technovation, Spring 1997, p 1.]

CASSINI SPACECRAFT ARRIVES AT KSC FOR LAUNCH PREPARATIONS

NASA's Cassini spacecraft, due for launch toward the planet Saturn in early October, has arrived at Kennedy Space Center (KSC). It was shipped from Edwards Air Force Base, CA, aboard a U.S. Air Force C-17 air cargo plane. The spacecraft now is undergoing final integration and testing prior to being taken to Launch Complex 40 for mating to an Air Force Titan IV launch vehicle. At KSC, integration of the 12 science instruments not already installed will be finished. The large parabolic high gain antenna and the propulsion module will be mated to the spacecraft. At that point, an integrated functional test will be run to verify that all these systems are operating properly together. [The Brevard Technical Journal, May 1997, p 4.]

AIR PRODUCTS AND CHEMICALS, INC. TO SUPPLY FUEL

The Air Products and Chemicals, Inc., liquid hydrogen production facility near Pensacola will supply additional rocket fuel to NASA under a \$78 million contract with the space agency. [The Brevard Technical Journal, May 1997, p 8.]

KSC FACILITY TO BE MODIFIED BY JACKSONVILLE FIRM

Sauer, Inc., Jacksonville, Florida, has been awarded a \$982,800 contract to modify the Converter/Compressor Facility in KSC's Launch Complex 39 area. The contract allows Sauer 306 days from the date of signing to complete modifications to the existing facility. The modifications will provide the capability to accept liquid helium from tankers, convert the liquid to gas, and compress the gas to interface with the existing high pressure compressor system. The conversion and compression equipment is slated for delivery later this year under several separate contracts. This is KSC's first step toward transition from existing gaseous helium supply to a liquid conversion system. Commercial suppliers could only meet KSC's large helium requirement by transporting it in liquid form to KSC. A follow-on construction contract for the second phase of the project will provide an on-site storage capacity of 60,000 gallons of liquid helium. Phase two is scheduled to be complete by May 1999. [The Brevard Technical Journal, May 1997, p 20.]

JUNE

June 2:

A MAKE-OR-BREAK ROCKET DEAL?

Aerospace giants McDonnell Douglas and Lockheed Martin are in a winner-take-all battle to build the next generation of U.S. government rockets to launch satellites. The victor will get a \$2 billion contract to build a family of vehicles to launch most military and civil government satellites in the early 21st century. The winner also will get a huge, government-subsidized edge in manufacturing cheaper rockets for an increasingly lucrative and competitive commercial satellite launch market. Up for grabs is the chance to build the Air Force's Evolved Expendable Launch Vehicle. The project actually will be a family of small, medium and heavy-lift rockets. The so-called EELV is centerpiece of a \$2 billion modernization program to replace the Delta, Atlas and Titan rockets now used by the Pentagon to loft small, medium and large military navigation, communications and spy satellites. With a year to go before the contract is awarded, neither company appears to be a front-runner said Paul Nesbit, president of JSA Research Inc. of Newport R.I., an investment management company that keeps tabs on the aerospace industry. [Florida Today, June 2, 1997, p 2A.]

June 3:

AGENCY WANTS TO BREAK SPACE JAM

Rockets launch at Cape Canaveral Air Station at Pony Express speed, every several weeks or sometimes longer. If you want to launch something on an Atlas rocket, for example, you'll have to wait until the year 2000. A state agency wants to change that pace to Federal Express speed, launching six hours after a customer calls. The agency is developing plans to spend \$2 million to convert an old 1960s era Titan launch pad into a new "quick response" launching area for small rockets carrying mini-satellites. Today Israeli Aircraft Industries officials will tour Cape Canaveral, looking to match their small Shavit II rocket to local plans for a speedy launching system. These are small rockets that carry less weight than Atlases, Deltas or Titans but cost much less to launch. Instead of the larger rockets' \$50 million to \$200 million launch cost, Shavits and similar sized rockets cost about \$10 million, experts say. [The Orlando Sentinel, June 3, 1997, p B-1 & B-6.]

June 4:

COLUMBIA PASSES MILESTONE TOWARD QUICK REFLIGHT

NASA's space shuttle program passed a major milestone today on its way to reflying the orbiter Columbia and the first reflight of the same payload and crew in space shuttle history. Columbia, which saw an abbreviated mission in April due to indications of a faulty fuel cell, was transported from Florida's Kennedy Space Center (KSC) Orbiter Processing Facility (OPF) to the Vehicle Assembly Building today where it will be mated with an external tank and solid rocket boosters in preparation for roll-out to Launch Pad 39A next week. With the Spacelab payload secure in the orbiter's cargo bay, NASA remains on track for a targeted July 1 launch date for

reflight of the Microgravity Science Laboratory mission. Columbia launched on April 4 and landed in Florida on April 8 without completing the mission's science objectives. About two weeks later, shuttle program managers decided to reflly the Microgravity Science Laboratory mission on STS-94 as soon as possible within safety guidelines. "This decision demonstrated the Shuttle program's confidence in the KSC processing team," said Bob Sieck, Director of Shuttle Processing. "Special credit goes to the workers in the Orbiter Processing Facility Bay 1. They produced a quality product in record time." The ambitious schedule required that all experiment reseriving be done while the Spacelab remained in the Shuttle's payload bay. Between flights, Spacelab is normally removed and then transported to KSC's Operations and Checkout Building for rework in a spacious environment. Payload technicians overcame the Shuttle's cramped conditions and successfully completed many critical tasks such as replenishing the flammable fluids of a combustion experiment. "This is the first time that a payload has remained in an orbiter between flights," said KSC Payload Manager Scott Higginbotham. "We are excited about having accomplished something that has never been tried before." With the original STS-83 astronauts slated to fly again on STS-94, additional time savings were achieved by leaving the crew compartment set-up virtually unchanged. The crew equipment interface test and the terminal countdown demonstration test, both familiarization exercises previously completed by the crew, were deemed unnecessary for this reflight mission. Columbia is scheduled to roll out of the Vehicle Assembly Building on June 11, bound for launch pad 39A. The STS-94 launch is currently targeted for July 1 at 2:37 p.m. EDT. [NASA News Release #97-122, June 4, 1997.]

June 5:

SHUTTLE BOOSTERS MAY GET LIQUID FUEL

In what could be the biggest single change to the design of the space shuttle, NASA is seriously considering replacing the shuttle's solid-rocket boosters with liquid-fueled rockets that can fly back to Kennedy Space Center after they are jettisoned. Using a new design probably would be safer and less expensive than the shuttle's current boosters, which triggered the fatal 1986 Challenger explosion, NASA officials and outside experts said. Shortly after a shuttle is launched, the boosters' fuel is spent and they fall into the sea with the aid of parachutes. They are recovered and reused. NASA this week awarded \$1 million contracts each to aerospace giants Lockheed Martin and Boeing Co. to study and design liquid boosters that can fly back to KSC on auto-pilot. If NASA decides to change boosters, it would happen about 2002, said NASA spokesman Kyle Herring. In 1992, NASA had to trim \$350 million from the shuttle's development cost. So the agency dropped the liquid fuel concept because solid rockets are less expensive to develop. However, liquid-fuel rockets have a reputation for being less expensive to operate over the long term. Until the shuttle first launched in 1981, all NASA's manned space flights had used liquid boosters. [The Orlando Sentinel, June 5, 1997, p A-13.]

June 6:

FAULTY TILES MAY DELAY COLUMBIA

The space shuttle Columbia may not make its July 1 launch date because of problems with cracked heat-shielding tiles, NASA said Friday. NASA already knew it had a problem with some of Columbia's tiles and had planned to fix them when the shuttle moves to the launch pad later this month. But on Friday afternoon technicians discovered that an additional 16 tiles had to be replaced. Technicians will work this weekend on the problem. In the next week or two NASA managers will decide if the tiles can be replaced in time for the July 1 launch. NASA is trying to launch Columbia less than two months after it landed in what would be a post-Challenger record for shuttle preparations. The quick re-flight is being attempted because Columbia's flight last April was cut short by 12 days because of a faulty electrical generator. [The Orlando Sentinel, June 7, 1997, p A-11.]

June 9:

ANTI-NUKE ACTIVISTS PLOT PEACEFUL WAR

Anti-nuclear activists will stage a series of peaceful protests at the gates of Cape Canaveral Air Station, protesting NASA's launch in October of a plutonium-powered spacecraft to explore Saturn. Organizers expect about 100 people to attend a demonstration Saturday (June 14), said Bruce Gagnon, organizer for the Gainesville-based Florida Coalition for Peace and Justice. The demonstrators worry an accident during the Titan rocket launch Oct. 6 or when the Cassini probe makes a flyby of Earth in 1999 could cause the highly toxic plutonium to be released, endangering people and the environment. However, NASA officials say the plutonium devices are safe and have been rigorously tested by the Department of Energy. The units have been blasted, crushed and exposed to the extreme pressures that would be unleashed by a rocket explosion. The test were to make sure they would not break open if something went wrong. Cassini will carry 72.3 pounds of plutonium to provide electricity for its instruments. "We would not agree to launch these materials if it wasn't safe to do," said Beverly Cook, who heads the DOE's space nuclear program division in Washington, D.C. Saturday's protest will be followed by two in July and October, as well as an around-the-clock vigil at the Cape during the last two weeks leading up to the launch, Gagnon said. Demonstrators say they plan to try to climb fences at the air station and attempt to sit on the Titan launch pad to stop the liftoff. Air Force officials declined to comment on security measures, but Brig. Gen. Randall Starbuck said demonstrators have the right to express their views lawfully outside the station's boundaries. Meanwhile, work continues at Kennedy Space Center to assemble the two-story spacecraft and prepare it for launch. [Florida Today, June 9, 1997, p 1A & 2A. The Orlando Sentinel, June 9, 1997, p A-6.]

NASA NAMES MANAGERS

NASA named three top managers to Kennedy Space Center on Monday, including the spaceport's first black and female senior executives. James Jennings was named

deputy director in charge of business operations. He had been acting deputy director and before that, was director of administration. JoAnn Morgan was named associate director for advanced development. She had been in charge of shuttle upgrades and safety. Women and minorities have held similar or higher ranks at other NASA centers and its headquarters. Also Monday, ex-astronaut Loren Shriver was named deputy director for launch and payload processing. Shriver, who has been manager of launch integration for NASA's space shuttle program, will take over the job Aug. 15. [The Orlando Sentinel, June 10, 1997, p A-4. Florida Today, June 10, 1997, p 2A.]

MIR CREW PATCHES UP COOLING SYSTEM

The Russian-American crew of the Mir space station tried Monday to patch a leak in the cooling system -- one of a string of breakdowns that has raised doubts about safety aboard the orbiting outpost. The temperature control system began leaking coolant in early April and briefly raised temperatures on some parts of the station to above 86 degrees. The temperatures came down after the crew plugged two major leaks, but the location of a third had evaded them for months. The final leak was located over the weekend, Vera Medvedkova, a spokeswoman for the Mission Control Center near Moscow, said Monday. The crew was working to fix it, using equipment recently delivered by the NASA space shuttle Atlantis. Russian space officials said the quantity of leaking antifreeze was far below levels that would be harmful to the crew. [The Orlando Sentinel, June 10, 1997, p A-4.]

June 10:

SPACE LAB DEEP IN RED, REPORT SAYS

Boeing Co., hired by NASA to build the \$28.6-billion International Space Station, is causing hundreds of millions of dollars in cost overruns and schedule delays, according to a federal report released Tuesday. If the problems continue, Congress may have to throw more money at a venture that has come under increasing assault on Capitol Hill because of expensive delays caused by financial trouble in Russia, a key partner in the project. Cost overruns by Boeing have tripled in the past year, skyrocketing to \$291 million, according to the General Accounting Office. In 1995, by contrast, Boeing was \$27 million under budget. If the overruns and Russian financial woes continue, Congress and the Clinton administration should rethink the program, GAO associate director Thomas J. Schulz said in the report. It's unlikely, however, that Congress would sacrifice a project that already has cost taxpayers more than \$10 billion. The station, being built by the United States, Russia, Canada, Japan and other countries, would be the biggest man-made construction project in space. The U.S. share of the cost, \$28.6 billion, is by far the largest. [The Orlando Sentinel, June 11, 1997, p A-1 & A-13.]

June 11:

COLUMBIA AWAITS LIFTOFF GO-AHEAD

Shuttle Columbia crept to its launch pad Wednesday at Kennedy Space Center, but

technicians will be hard-pressed to complete a tile replacement job in time for its planned July 1 liftoff. In the midst of what could be a record-setting push to re-launch Columbia on a mission cut short this year, technicians today will begin replacing 36 heat-resistant tiles on the nose of the shuttle. NASA ordered the replacement work after routine inspections showed the tiles -- which protect the orbiter and its crew from temperatures up to 2,000 degrees Fahrenheit during atmospheric re-entry -- might crack during thruster firings in orbit. "The plan in place right now shows the work being done in time for launch, but the schedule is tight," KSC spokesman Joel wells said. Technicians removed the suspect tiles, which surround clusters of steering thrusters on the shuttle's nose, before Columbia made an overnight move from the 52-story Vehicle Assembly Building to its launch pad. The replacement work is scheduled to be wrapped up June 28, which is less than 24 hours before a three-day launch countdown is to begin. If Columbia takes off July 1, NASA would set a post-Challenger record for the speediest shuttle turnaround between missions -- 84 calendar days. The previous post-Challenger record -- 102 calendar days -- was established in 1996. [Florida Today, June 12, 1997, p 1B.]

June 13:

ASTRONAUTS GO ONLINE

The astronauts assigned to NASA's next mission to the Russian space station Mir have faced various scenarios in training for a space flight, and now Web crawlers can get a glimpse of the rigorous regime they face on the crew's own Internet site. The brainchild of astronaut Scott Parazynski, the site is not to be confused with the dozens of "official" Internet home pages operated by NASA. "NASA does a fantastic job with all their various Web sites, and they are some of the most popular on the Internet," said Parazynski, a medical doctor-turned-astronaut-turned-cyberspace guru. "But nowhere on the Internet can you find this story in the words of the folks that actually go fly in space." Up until now, that is. Check out the following address -- <http://www.phoenix.net/~shuttle> -- and you'll find the inside scoop on the shuttle-Mir docking mission, which is set for launch Sept. 18 from Kennedy Space Center. During the past month, the site has won 18 awards from the likes of USA Today, Cool Site of The Day, Internet All-Stars and The Supersite For Kids. [Florida Today, June 13, 1997, p 1A & 2A.]

ACE SPACECRAFT ARRIVES AT KSC TO BE PREPARED FOR LAUNCH

NASA's Advanced Composition Explorer (ACE), to be launched aboard a McDonnell Douglas Delta II rocket in August, arrived today at the Kennedy Space Center to begin prelaunch processing. The spacecraft, built for NASA by the Johns Hopkins University Applied Physics Laboratory, was shipped by truck from the Goddard Space Flight Center in Greenbelt, Md., yesterday. ACE is a spin-stabilized spacecraft having a combination of nine sensors and instruments. Spinning at five revolutions per minute, it will investigate the origin and evolution of solar phenomenon, the formation

of the solar corona, solar flares and the acceleration of the solar wind. The spacecraft will orbit the Libration Point, a location 900,000 miles from Earth where the gravitational effects of the Sun and Earth are balanced. ACE will be able to give scientists information about the effect of the Sun on the near-Earth environment, as well as interplanetary space while also providing clues about the lifestyle of similar stars. There are also two secondary investigations on the satellite itself. The Real Time Solar Wind Monitor for the National Oceanic and Atmospheric Administration (NOAA) will provide continuous "space weather" information that can give limited advance warning of geomagnetic storms. The Spacecraft Loads and Acoustics Monitor for the Goddard Space Flight Center is a research and development payload which will monitor the sound characteristics a spacecraft experiences within the rocket's nose fairing environment during launch. The ACE spacecraft will undergo final experiment integration and functional testing at the Spacecraft Assembly and Encapsulation Facility-2 located in the KSC Industrial Area. ACE will be transported to Space Launch Complex 17 and erected atop a Delta II 7920-8, a two-stage rocket manufactured by McDonnell Douglas. The buildup of the Delta vehicle on Pad 17-A is scheduled to be performed the week of July 21. This will include the erection of the first and second stages and attachment of the nine strap-on solid rocket boosters. Atop the launch vehicle, the nose fairing is to be installed around the spacecraft four days before launch. Launch of Delta II/ACE is scheduled for Thursday, Aug. 21 at the opening of a launch window which extends from 10:53:38 - 11:18:38 a.m. EDT., a duration of 25 minutes. [NASA News Release #89-97, June 13, 1997.]

ASTRONAUTS MCMONAGLE, HARBAUGH TAKE ON NEW ASSIGNMENTS

Astronaut Donald R. McMonagle has been named manager, Space Shuttle Launch Integration at the Kennedy Space Center, replacing Loren Shriver, effective Aug. 15, following the STS-85 mission. The announcement by Shuttle Program Manager Tommy Holloway follows the appointment of Shriver earlier this week to the staff of Kennedy Director Roy D. Bridges, Jr., as deputy director, launch and payload processing. McMonagle will begin the transition to his new position immediately. He will be responsible for final Shuttle preparation, mission execution and return of the orbiter to Kennedy following landings at Edwards Air Force Base, CA.

Gregory J. Harbaugh has been named acting manager of the Extravehicular Activity Projects Office, replacing McMonagle. That appointment by Johnson Space Center Director George Abbey is effective immediately to allow a smooth transition between the two, prior to McMonagle's move to Kennedy. [NASA News Release #97-134, June 13, 1997.]

June 14:

EX-NASA OFFICIAL PROTESTS CASSINI

A retired NASA safety official has switched sides on the issue of launching nuclear

material and is telling Brevard County residents to leave town in October when NASA tries to send a probe with 72 pounds of plutonium into space. The man whose job was to protect Kennedy Space Center's workers when plutonium-powered space probes were launched in 1989 and 1990 said he will join a group of anti-nuclear activists today to protest the planned Oct. 6 launch. Alan Kohn of Casselberry, who as emergency preparedness operations officer was commended by NASA for his work during the 1990 Ulysses launch and the 1989 Galileo launch, said Thursday that NASA is not doing enough to protect nearby residents in case of an accident. But Joel Reynolds, safety director at Kennedy and the chief emergency planning officer during the Ulysses and Galileo launches, said the launch is safe for all of Florida. Reynolds, who commended Kohn in a 1990 letter, said he was surprised by Kohn's new stance but doesn't think it will hurt NASA's chances to launch Cassini. NASA estimates the chance that the rocket would explode on launch and release plutonium into the air at 1 in 1,500. The plutonium is in super-hardened ceramic chunks that cannot be inhaled. [The Orlando Sentinel, June 14, 1997, p A-6.]

**June 16: MARS LANDING JULY 4 MAY BE MORE DAZZLING
 THAN FIREWORKS**

Snapshots of Mars from the robot explorer will beam into millions of living rooms Independence Day in the latest in a string of tantalizing revelations that has rejuvenated NASA. It has been more than 20 years since NASA sent an emissary to the Martian surface. While the event may not rival the television audience for Neil Armstrong's walk on the moon, the July 4 landing is shaping up to be a significant milestone. America returns to the surface of Mars with a robot explorer that will send pictures of the Red Planet's horizon to untold millions of "virtual visitors" watching the transmissions back on Earth. NASA expects an Internet "siege" of 25 million hits from computer users worldwide. [Florida Today, June 16, 1997, p 1A & 2A.]

**SHANNON ROBERTS APPOINTED AS KSC
ADMINISTRATION DIRECTOR**

Kennedy Space Center Director Roy D. Bridges, Jr., has appointed C. Shannon Roberts to be Director, Administration Office effective June 22, 1997. She succeeds James L. Jennings, who has been named the Center's Deputy Director for Business Operations. Roberts will lead many important areas including human resources programs for civil service personnel, workforce effectiveness and organization, industrial labor relations, strategic planning, continuous improvement and functional management reviews. [NASA News Release #90-97, June 16, 1997.]

**June 17: SPACEWALKERS NAMED FOR SPACE STATION
 ASSEMBLY FLIGHTS**

A cadre of 14 Space Shuttle astronauts has begun intensive training in preparation for

spacewalks required for on-orbit construction of the International Space Station. The first astronauts assigned to train for space station assembly tasks were Jerry L. Ross (Col., USAF) and James H. Newman, Ph.D., who were named to the STS-88 crew in August 1996. Training will now expand to include Leroy Chiao, Ph.D.; Robert L. Curbeam, Jr., (Lt. Cmdr., USN); Michael L. Gernhardt, Ph.D.; Canadian Astronaut Chris A. Hadfield (Lt. Col., CAF); Thomas D. Jones, Ph.D.; Mark C. Lee (Col., USAF); Michael Lopez-Alegria (Cmdr., USN); William S. "Bill" McArthur, Jr., (Col., USA); Carlos I. Noriega (Major, USMC); James F. Reilly, II, Ph.D.; Joseph R. Tanner; and Peter J. K. "Jeff" Wisoff, Ph.D. [KSC Countdown, June 17, 1997.]

June 18: TEAM AIMS TO KEEP KSC BUSY INTO 21ST CENTURY

A new NASA management team is looking beyond the space shuttle and planned international space station in a bid to keep Kennedy Space Center's federal work force in business in the 21st century. Talking more like corporate executives than government bureaucrats, the managers on Wednesday presented a faint outline of a strategic plan that would move KSC government engineers out of shuttle hangars and into research labs. The radical shift will come gradually as NASA turns over day-to-day shuttle fleet operations to a private company and completes the \$40 billion station, which is to be raised over a five-year period beginning next summer. In the same time the KSC civilian work force is expected to drop from 1,950 people today to 1,475 people. "I think we need to be looking further out in the future, deciding what we think we want to do here at the Kennedy Space Center in years ahead," said Loren Shriver, who recently was named deputy director of launch and payload operations at KSC. And rather than wait for one giant anchor project like the shuttle, the strategy involves aggressively pursuing new business in the form of smaller research projects. Among them are:

Staging test flights of NASA's X-34, a new reusable launch vehicle that will fly suborbital missions at eight times the speed of sound. No contract has been signed with X-34 manufacturer Orbital Sciences Corp., but missions that would test the craft's ability to fly in bad weather are expected to be launched from KSC as early as next year.

Design work on proposed liquid-fueled flyback booster rockets for the shuttle. Considered safer than current solid-fuel shuttle boosters, the new rockets would fly back to Kennedy's shuttle runway rather than parachute into the ocean.

Research and development of life-support systems for space stations and space colonies as well as lab work that would pave the way to propellant plants on Mars.

The hot pursuit of new contracts represents a new way of doing business at KSC, one spurred by increasingly heated competition in a cutthroat aerospace world. "We have not done this before," said Joanne Morgan, associate director for advanced development and shuttle upgrades at KSC. But she added, "there's some very intense

economic competition going out there globally, and we intend to be a player."
[Florida Today, June 19, 1997, p 11A.]

June 19:

KSC PRINT SHOP GETS NEW LOOK

The KSC Print Shop - now called the Duplicating Facility - has undergone renovations to better reflect its new capability. Three electronic publishers and one multi-color printer have replaced 22 pieces of existing equipment. Three Xerox DocuTech 6135 include scanners to convert hardcopy documents to electronic format. The new equipment can print at a higher rate and the product quality is much improved, noted Dave Severance, project manager, Information Services, Sherikon Space Systems Inc., the subcontractor which operates the Duplicating Facility for Base Operations Contractor EG&G Florida. Fiscal Year 1997 cost-savings are estimated at about \$224,000, and outyear cost avoidance will be about \$240,000 per year. [KSC Countdown, June 19, 1997.]

JULY 1 SELECTED FOR MICROGRAVITY SCIENCES LABORATORY REFLIGHT

NASA managers set July 1 as the official launch date for Space Shuttle Columbia and the reflight of the Microgravity Science Laboratory-1 payload following completion of the STS-94 Flight Readiness Review at the Kennedy Space Center. The original MSL-1 mission during STS-83 in April was shortened due to the suspect performance of a fuel cell. The STS-94 launch window opens at 2:37 p.m. EDT and extends for 2 ½ hours. The MSL-1 mission has a planned duration of 16 days. An on-time launch on July 1 and nominal mission duration will result in Columbia landing at about 7:13 a.m. EDT, on July 17. STS-94 will be the 23rd flight of Columbia and the 85th mission flown since the start of the Space Shuttle program in April 1981. [NASA News Release #97N-97, June 19, 1997.]

June 20:

GLENN'S SKY-HIGH DREAM: RETURN TO SPACE

John Glenn, who turns 76 next month, is seriously talking with NASA about returning to space more than 35 years after he was the first American to orbit the Earth. A second flight for the ex-astronaut and U.S. senator from Ohio is not planned now. However, it is a possibility because the space agency is interested in increasing research on how space alters the aging process, a NASA spokesman said. "NASA has discussed the idea with the senator, and we are giving it further consideration," NASA spokesman Michael Braukus said Friday. Glenn flew on Mercury 6, circling the Earth three times on Feb. 20, 1962. He would become the oldest person in space, beating a record set last year by Story Musgrave, 61. "There are a lot of positives," said Apollo 11 astronaut and National Space Society Chairman Buzz Aldrin. For Glenn to fly again, NASA would have to change its policy against taking civilians into space. The policy was established after teacher Christa McAuliffe died on the 1986 Challenger

explosion. [The Orlando Sentinel, June 21, 1997, p A-1.]

June 22: NASA PAYS BIG BUCKS TO DELIVER STATION PART

For 12 years NASA has been planning a space station, designing and redesigning pieces and spending \$18.6 billion in the process. Finally, part of that project is heading close to the eventual launch site, Kennedy Space Center. The cost of transporting the part, a 22-foot-long room called Node 1, is three times higher than originally planned. Instead of shipping the room from Alabama, where it was built, on a barge as first planned, it's arriving on an Air Force cargo jet. The cost of the flight is about \$1.5 million, compared with \$500,000 for the barge, said NASA spokesman James Hartsfield. Johnson Space Center Director George Abbey, who oversees the space shuttle and station programs, was worried about potential problems with the slow barge system. NASA relies on barges to carry the large external fuel tanks for shuttles to KSC, said Glenn Snyder, payload manager for Node 1. NASA doesn't want a repeat of a problem that occurred in 1994 when a tank-carrying barge got stranded during Tropical Storm Gordon. The tank was rescued, but the salvage company that saved it went to court to claim the fuel tank under maritime salvage laws. The government paid an undisclosed amount to the rescuers to get the tank back. In another case, bad weather delayed the barge for 10 days in the mouth of the Mississippi River, Hartsfield said. Despite the extra cost, the arrival of Node 1 is considered a major milestone. [The Orlando Sentinel, June 22, 1997, p A-7.]

June 23: CASSINI COUNTDOWN

Cassini program officials at NASA's Jet Propulsion Laboratory (JPL) are monitoring the operation of three inertial reference units (IRUs), two on the spacecraft at Kennedy Space Center and a spare at JPL, after detecting some slower start-up times than usual on the two spacecraft units. The two IRUs, on the spacecraft scheduled for an October launch, have been taking about 20 sec. longer than normal to start up. Each IRU has four Litton hemispherical resonator gyros (HRGs). Program officials said they want to determine the cause of the slow down and make sure there will not be additional start-up variations prior to launch. The start-up process is controlled by software, but JPL officials believe the problem is in the resonator rather than the software. The change on Cassini was initially detected last month. The HRGs, which have no moving parts, were selected for their potential reliability on the long Cassini mission, which is scheduled for more than 10 years duration. [Aviation Week & Space Technology, June 23, 1997, p 13.]

INTERNATIONAL SPACE STATION FLIGHT HARDWARE
ARRIVES AT KSC

Node 1 of the International Space Station, arrived at KSC early yesterday morning at the Shuttle Landing Facility. The Node, which is the first piece of flight hardware to

arrive at KSC, was shipped from Marshall Space Flight Center, Huntsville, AL, and transported aboard an Air Force C-5 air cargo plane that landed at about 1:30 a.m. "It's a day we've been waiting for. It's the first time we've seen U.S. space station hardware here at KSC," center spokesman Bruce Buckingham said. The Node was scheduled to be offloaded last evening and transported to the Space Station Processing Facility (SSPF). At the SSPF, the U.S.-manufactured Node will begin processing for its launch aboard STS-88 in July 1998. About 11 months of testing will follow before the node is delivered to a KSC launch pad for installation in Endeavour. [KSC Countdown, June 24, 1997. Florida Today, June 24, 1997, p 2A.]

June 25:

NASA LAUNCH MANIFEST IS RELEASED

Copies of the NASA Mixed Fleet, Payload Flight Assignments, June 1997 edition, are available from the NASA news centers or on the Internet at URL: <http://www.osf.hq.nasa.gov/manifest/> This manifest summarizes the missions planned by NASA for the Space Shuttle Expendable Launch Vehicles (ELVs) as of June 1997. Space Shuttle and ELV missions are shown through calendar year 2003. Space Shuttle missions for calendar years 2002-2003 are under review pending the resolution of details in the assembly sequence of the International Space Station. [NASA News Release #N97-45, June 25, 1997.]

CARGO SHIP SLAMS MIR

An American and two Russians are struggling with life aboard a darkened, crippled space station Mir today after a collision with a cargo ship caused a potentially fatal air leak and serious power outage. Circling 250 miles above the Earth, the three men were not injured in the accident early Wednesday, and there were no immediate plans to abandon ship aboard a lifeboat parked at the Russian station. But the wreck severely damaged one of Mir's six labs and cut station power by 50 percent. It also punched a dime-sized hole in the lab, sending the crew on a scramble to seal the module before all the air within Mir was sucked out. Moving quickly to conserve power, the crew turned off all but essential life-support systems. The men -- U.S. astronaut Michael Foale, Mir Commander Vasily Tsibliev and flight engineer Alexander Lazutkin -- have enough food, water and other supplies to survive, officials said. The drama unfolded about 5:20 a.m. Wednesday as Tsibliev tried to guide an unmanned cargo craft called Progress to a remote-control docking with the Kvant-1 astrophysics lab. Filled with garbage, the space freighter had been dispatched from Mir on Tuesday and was being brought back as part of a docking-system test. However, Tsibliev lost control of the 8-ton cargo ship as it made a final approach to Mir, and the craft slammed into one of four power-producing solar wings attached to an adjacent lab called Spektr. The wayward ship then bounced off the Spektr lab itself before slowly tumbling away from Mir. [Florida Today, June 26, 1997, p 1A & 9A.]

HOUSE SUBCOMMITTEE GIVES NASA'S SPACE STATION BUDGET THUMBS UP

The space shuttle and the International Space Station program would receive full funding next year under a bill passed Wednesday by the House subcommittee that governs NASA's purse strings. Overall, the subcommittee recommended giving NASA about \$13.65 billion in budget year 1998 -- \$148 million more than the administration requested, but \$61 million less than the agency's current funding. Human space flight would get \$5.3 billion, as requested by NASA. The subcommittee recommendations include a new \$100 million fund to cover cooperation between NASA and Russia's space program. NASA could tap into the "U.S.-Russian Cooperation and Program Assurance Fund" if Russia is unable to meet financial goals for constructing the International Space Station. The fund also would pay for U.S. astronauts who fly on Russia's Mir space station. It accounts for most of the \$148 million the administration did not request. The subcommittee also recommended giving NASA the ability to transfer up to \$150 million into the space station program if it can cut money from other areas of its budget. The full House Appropriations Committee will discuss NASA funding after Congress returns from its weeklong Fourth of July holiday. The bill could hit the House floor the week of July 14. [Florida Today, June 26, 1997, p 8A.]

June 27:

COSMONAUTES PLAN DARING MANEUVER TO AID TROUBLED MIR

In a daring plan to restore more power to the crippled Mir space station, Russia decided Friday that two cosmonauts will go into a dead and depressurized lab to install a new hatch and restore full electricity to Mir in mid-July. Also Friday, the power supply on Mir got so low that a computer was unable to control the station's steering system. The three-man crew had to use the thrusters on the attached Soyuz escape capsule to turn Mir and face its solar panels toward the sun. The move worked and steering was re-established a few hours later. Meanwhile, NASA and Russian officials are just starting to look into why a robot ship went out of control and crashed into the outpost Wednesday. Outside space experts have two suspects: pilot error by the accident-prone commander of Mir, who was flying the robot ship by remote control, or equipment failure in the cut-rate manual guidance system, which has failed before. At the moment, restoring power to Mir is the main priority of both space agencies. The damaged lab, called Spektr, has been sealed off, and the rest of the station is at 50 percent power. Three of the four solar power panels on top of Spektr are functional. But to seal the lab to prevent the entire station from becoming depressurized, the Russian and American crew had to disconnect electrical cables carrying power from Spektr to the rest of Mir. After the repair equipment comes in a resupply flight, scheduled to launch between Friday and July 8, cosmonauts Vasily Tsibliev and Alexander Lazuktin will don spacesuits and enter the lab, NASA shuttle-Mir director Frank Culbertson said. U.S. astronaut Michael Foale will watch from

inside the Soyuz escape capsule, the "most conservative" approach. Tsibliev and Lazutkin will install a new hatch designed to allow up to 22 electrical cables to pass through without breaking the airtight seal. Officials worry that during the procedure the cosmonauts could tear their suits on the debris expected to be floating around in the lab. Meanwhile, the Russian Space Agency and NASA each appointed investigation boards to determine why the progress resupply ship crashed into Mir during a docking system test. NASA's board is headed by veteran astronaut Michael Baker. [The Orlando Sentinel, June 28, 1997, p A-1 & A-7.]

June 28:

WEATHER MAY KEEP COLUMBIA ON THE GROUND

NASA started the countdown Saturday for shuttle Columbia's planned launch Tuesday with some bad news -- a 90 percent chance that thunderstorms will scuttle the liftoff. Forecasters say the reason is simple: Typical hot summer weather that will mix with a sea breeze and keep dangerous weather close to the coast. Nonetheless, NASA is pressing on and hoping for a break. Liftoff is set for a 2 ½-hour window that starts at 2:37 p.m. One way NASA could work around the weather is to put the crew aboard Columbia later in the day, NASA spokesman George Diller said. If that happens, the ship could fly as late as 8:08 p.m. The seven astronauts arrived Saturday at Kennedy Space Center. The shuttle's mission is unrelated to the crisis at Russia's Mir space station. Columbia is not equipped to dock at Mir and is too heavy to even reach the space station's orbit. [The Orlando Sentinel, June 29, 1997, p A-8. Florida Today, June 29, 1997, p 1B.]

COSMONAUT DOUBTS CREW CAN FIX MIR

The Russian commander of the stricken Mir space station expressed doubt Saturday that its three-man crew could fix the 11-year-old orbital complex after its worst accident. Mission Control Center specialists radioed Tsibliyev aboard the power-rationed Mir complex early Saturday to discuss plans for a spacewalk within the damaged Spektr module that has been sealed off since it was punctured and depressurized by the wayward supply craft. After another supply ship carrying equipment for repairs reaches Mir around July 7, Tsibliyev and fellow cosmonaut Alexander Lazutkin would don spacesuits, empty the air from inside the still-functioning components of the space station and squeeze through the 2-foot-wide hatch connecting Mir with Spektr, where they would attempt to reconnect the marooned solar panels with Mir's main electrical grid. While the cosmonauts work inside Spektr, Foale would man the Soyuz TM "lifeboat" capsule in case the operation goes wrong and the trio has to return to Earth. "I have never done this kind of work. Without training, it will not be possible to do this job," Tsibliyev told flight coordinator Vladimir Solovev. Solovev assured the cosmonaut that "we will help you" and encouraged the Mir crew to begin planning and practicing for the risky rescue work today. [The Orlando Sentinel, June 29, 1997, p A-8.]

LIFE ON MIR 'GETTING BACK TO NORMAL'

For American astronaut Michael Foale and his two Russian comrades, the daily grind on the damaged Mir space station is an exercise in guts, patience and hope. Floating through the darkened, eerily silent ship, they put flashlights in their mouths to see where they are going as they press on with their life-on-the-edge existence. The work includes trying to turn on a primary oxygen generator and heat-regulation system, checking gyroscopes that keep Mir's position stable and talking to ground controllers about a dangerous scheme to patch their ship. "Slowly, slowly, we've gotten things back together," Foale said Saturday. "So life is getting back to normal for me." Foale provided that glimpse into the crew's struggles as experts in Russia and the United States continued working on a plan to send two cosmonauts into a sealed-off lab that was punctured Wednesday after a collision with a cargo ship. The Russians want Mir Commander Vasily Tsibliev and flight engineer Alexander Luzutkin to don spacesuits and venture into the Spektr module to connect power cables to badly needed solar batteries inside. Foale would monitor the spacewalk from a Soyuz escape capsule, which is attached to Mir and could bring home the men at any time. **[Florida Today, June 29, 1997, p 1A & 11A.]**

During June: UKRAINIAN PAYLOAD SPECIALISTS SELECTED FOR SHUTTLE MISSION

NASA has announced the selection of Col. Leonid Kadenyuk, the first Ukrainian to fly on the U. S. space shuttle, as the primary payload specialists for the fourth U.S. Microgravity Payload flight scheduled for a November 1997 launch on the space shuttle Columbia as mission STS-87. NASA named another Ukrainian, Dr. Yaroslav Pustovyi, to serve as an alternate. As an alternate payload specialist, Pustovyi will undergo the same training as Kadenyuk and will be ready to serve on the mission crew if necessary. Kadenyuk will conduct the Collaborative Ukrainian Experiment (CUE), a series of 11 Shuttle middeck experiments focusing on the effects of microgravity on plant growth and pollination. **[The Brevard Technical Journal, June 1997.]**

KENNEDY SPACE CENTER ENGINEER TAKES CLEANLINESS TO NEW HEIGHTS

The first images from the Hubble Space Telescope's (HST) newly installed instruments have generated considerable excitement in the scientific community, and Kennedy Space Center (KSC) played a critical role. KSC contamination control specialist Jean Abernathy and her contractor counterparts, David Baska and Sally Hill, were responsible for protecting the instruments from Earthly contamination during the time they were being readied for flight at KSC. The multi-million dollar scientific instruments, composed of a series of exceptionally sensitive optics and automated mechanisms, required a near-pristine environment as pre-launch checkouts were conducted. While all NASA's payloads require high degrees of cleanliness, this

second HST servicing mission demanded extra care and a highly-controlled environment that exceed that available in the Vertical Processing Facility. Prior to the arrival of the first piece of flight hardware at KSC last October, Abernathy led a campaign to sensitize and inform the hundreds of base operations personnel at the space center as to the special nature of the HST payloads. She also coordinated with other KSC personnel to schedule the spraying of insecticides, building construction, controlled burns, asphalt work, and similar operations during times when the payloads were fully exposed and more sensitive to contamination. **The Brevard Technical Journal**, June 1997.]

JULY

July 1:

COLUMBIA POISED FOR MSL-1 REFLIGHT

A 90 percent probability of bad weather remains the primary concern for today's scheduled launch of Columbia and the reflight of the Microgravity Science Laboratory. NASA managers met late yesterday afternoon and decided to move the 2 hour, 30 minute launch window forward 47 minutes, thereby resetting the launch clock for a proposed 1:50 p.m. liftoff. Although the weather outlook appears to improve marginally tomorrow, the unpredictability of rapid weather changes is the reason the decision was made to continue with today's launch attempt. Meanwhile, operations continue as the shuttle is prepared for lift-off, and no technical issues were being worked at press time. Loading of the external tank with cryogenic propellants is scheduled to begin at about 4:45 a.m. today and launch commentary will begin at 8 a.m. Columbia's crew, led by Commander Jim Halsell, will depart crew quarters for the launch pad at 10:30 a.m. and begin boarding Columbia about a half hour later. The hatch will be closed and sealed at 12:20 p.m. [**KSC Countdown**, July 1, 1997.]

COUNTDOWN CHANGE ALLOWS SHUTTLE TO ELUDE STORMS

The space shuttle team here modified its countdown and liftoff timing to successfully launch the Columbia Microgravity Science laboratory mission earlier than originally planned to beat developing thunderstorms that could have scrubbed the flight. Columbia was launched on its 23rd mission at 2:02 p.m. EDT about 35 minutes earlier than had been planned. Initial science operations in Columbia's Spacelab module were going smoothly. [**Aviation Week & Space Technology**, July 7, 1997, p 30.]

WRECK INJURES 2 ASTRONAUTS

Two astronauts suffered minor injuries and a third person was also hurt in a two-car wreck on Courtenay Parkway, about a half mile north of Crisafulli Road, according to the Florida Highway Patrol. Troopers cited one of the astronauts for causing the accident. Astronaut Roger Carl Zwiag, 55, of Houston drove a 1997 Nissan Altima out of a parking lot and into the path of a 1993 Ford driven by Robert Alan Logsdon, 41, of Cocoa, according to Trooper D. C. O'Neill. Troopers cited Zwiag for violation of right-of-way. Zwiag's passenger was astronaut Charlie Juszit, 44, of Seabrook, Texas. Details of their injuries were not known late Monday, but none of the men needed to go to the hospital. Zwiag's car sustained heavy damage. Logsdon's car received moderate damage. [**Florida Today**, July 1, 1997, p 2A.]

MARRIAGE BUG STRIKES CREW

Columbia commander Jim Halsell, 40, proposed marriage to Merritt Island native Kathy Hampton while visiting the Grand Canyon. The couple met last Labor Day at a

holiday get-together. At the time, the veteran NASA flier was in the midst of a tour of duty as a "Cape Crusader" -- the name given to astronauts assigned to support shuttle crews from an office at KSC. Hampton, 34, works as a financial analyst with McDonnell Douglas at Kennedy Space Center. The marriage bug also has struck another member of Columbia's crew. Payload specialist Roger Crouch and Anne Novotny, a management analyst in NASA's Mission to Planet Earth program office in Washington, D. C., got engaged after Columbia's abbreviated flight. Crouch and Novotny will head off to Las Vegas after the upcoming flight to tie the knot. The Halsell-Hampton wedding is scheduled for late August in a Merritt Island church, almost a year to the day after the couple met. With Halsell in command, Columbia is scheduled to blast off from KSC today during a launch window that will open at 1:50 p.m. and close at 4:20 p.m. [Florida Today, July 1, 1997, p 5A.]

OXYGEN GENERATOR SHUTS OFF ABOARD MIR

The primary oxygen generator on the damaged Mir space station had to be shut down Tuesday, forcing the three men aboard to rely on a backup system that sparked a potentially deadly fire in February. U.S. officials, however, said the problem was a temporary setback and added that the crew is in no immediate danger. The crew -- which includes American astronaut Michael Foale and two Russian cosmonauts -- still is struggling to cope after a collision one week ago today punctured a laboratory module and cut the ship's power by half. [Florida Today, July 2, 1997, p 1A & 2A.]

KSC CREDIT UNION PLANS TO ADD 5 BRANCHES

Kennedy Space Center Federal Credit Union, with newly acquired permission to serve anyone who lives or works in Brevard and Volusia counties, announced long-range plans Tuesday to open five new branches in anticipation of a steady rise in membership. The 35-year-old Merritt Island-based credit union is in the early planning stages of the expansion, which targets cities in both counties. Officials will finalize plans in October, said Levoyce Bethea, credit union president. The credit union's expansion plans were preceded by a recent grant of a "community charter" by the National Credit Union Administration, the government body that regulates federally chartered credit unions. Community charter status allows the credit union, which originally could extend membership only to Kennedy Space Center employees and their relatives, to accept anyone who lives or works in Brevard or Volusia counties. [Florida Today, July 2, 1997, p 1B.]

July 2:

SCIENCE LAB BUSTLES ABOARD SHUTTLE

The crew of shuttle Columbia on Wednesday powered up its \$142 million microgravity lab, unleashed the first experiments and released a stream of data to scientists around the world. In what will be NASA's second-longest shuttle mission, the seven-member Columbia crew readied the lab for the nation's most ambitious

research project on the effects of zero gravity. Almost three-dozen experiments in areas such as biotechnology and combustion science are scheduled for the 16-day mission which was cut short in April because of technical problems with the orbiter. Though the work can be dull, microgravity research can play a major role in advancements in medicine, agriculture, transportation and consumer products, NASA officials say. It enables scientists to more precisely study things such as combustion flames, medicinal plants and protein crystals, which are affected by gravitational force. [The Orlando Sentinel, July 3, 1997, p A-4.]

NASA DECIDES NOT TO BRING FOALE HOME EARLY FROM MIR

NASA has decided there is no need to rush a shuttle to the crippled Russian space station Mir to rescue its three-man crew, officials said Wednesday. That means U.S. astronaut Michael Foale will have to wait until late September as originally planned to return to Earth. If an emergency develops, he can come home in a Soyuz escape capsule. NASA officials said they were confident in Russia's repair plans. Until Wednesday, shuttle managers at Kennedy Space Center had been studying how to move up the launch of Atlantis to mid-August. A decision had to be made this week because Atlantis would have to use boosters and a fuel tank being readied for Discovery. Conditions on Mir have stabilized since it was hit last week by a robot ship during a manual docking test. However, the station is still operating on half power, and the crew is using a backup oxygen system. On Wednesday, the two Russian cosmonauts and Foale worked on a faulty cooling system that forced them to shut off Mir's main oxygen generator. The repair work is expected to be completed today. Also Wednesday, the crew worked on their spacesuits in preparation for an "interior spacewalk" into the damaged and airless module that was punctured by the errant robot ship. The work -- designed to restore more power to the station -- is tentatively scheduled for July 11. The ship involved in the accident was commanded to return to Earth and burn up in the atmosphere Wednesday morning. The ships carry supplies to Mir and then routinely are disposed of after being packed with waste from the station. [The Orlando Sentinel, July 3, 1997, p A-5.]

July 3:

KSC AND PATRICK AIR FORCE BASE PREPARE FOR JOINT BOC CONTRACT

Civilian and military managers who oversee launch operations at the NASA Kennedy Space Center and the USAF Cape Canaveral Air Station are seeking approval from their respective headquarters to combine base support contracts for both the facilities. The objective is to save several million dollars in annual operating costs, with the hope those savings could be passed on to launch customers. The civilian and military launch facilities are now supported by different service contractors. Both Kennedy and the Cape encompass huge areas and extensive facilities. Operations at Patrick AFB, which supports the Cape, would also be under the plan. The USAF 45th Space

Wing is leading the effort on the military side. NASA and the USAF managers here hope the Pentagon and NASA Headquarters will approve the plan in time for the solicitation of bids by March, 1998, and the implementation of the new contract by October, 1998. The initiative is an offshoot of the NASA/Air Force Space Command (AFSPC) Partnership Council, which was established through a Memorandum of Agreement (MOA) signed Feb. 28, 1997. A key feature of the agreement is to identify areas where increased sharing or consolidation of activities can improve support services to civil, military and commercial customers, while producing cost savings for both the Air Force and NASA. [NASA News Release #130-97, July 3, 1997. Aviation Week & Space Technology, July 21, 1997, p 59.]

COLUMBIA CREW READY FOR A HOT TIME IN SPACE

The crew aboard shuttle Columbia may be lighting fires today, but don't expect them to be roasting any hotdogs this Fourth of July. Instead, the ship's seven astronauts will be spending Independence Day conducting a full plate of experiments as their research mission enters its third day, NASA officials said. All of the nearly three-dozen experiments in the shuttle's onboard laboratory are up and running, including some that call for astronauts to light small fires in a sealed chamber to test the product of soot. In another experiment, a water droplet was released and levitated by sound energy. Researchers are interested in how to position and manipulate the drop without a container. Data from the experiment might improve material processes on Earth. Columbia was reported operating smoothly, good news for a crew that had to return to Earth in April after only four days due to problems with a faulty fuel cell. [Florida Today, July 4, 1997, p 2A.]

LOCKHEED TO BUY OUT NORTHROP

Lockheed Martin Corp. announced Thursday that it is buying Northrop Grumman Corp. for \$7.9 billion. That means the new company -- which will retain the Lockheed Martin name -- will combine Lockheed's current 1,000 local employees with more than 2,000 Northrop workers for a Brevard County work force of more than 3,000 by the end of the year, if all goes as planned. [Florida Today, July 4, 1997, p 1A.]

July 4:

BACK ON MARS!

Against long odds, NASA's Mars Pathfinder spacecraft survived a dive onto the Red Planet on Friday and began reeling off panoramic pictures of a burnt-orange river valley full of rocks, boulders and ancient mountains. The breathtaking images of daylight breaking over the martian horizon were beamed throughout the world, stirring emotions of awe and wonder that again posed the question: Does Mars now, or did it once, harbor life? Nestled inside protective air bags, the Pathfinder lander and its six-wheeled rover reached the planet by rebounding like a giant superball off the valley's floor and taking a 94-second tumble before coming to rest. The high-stakes

Independence Day landing kicked off an accelerated hunt for life elsewhere in the cosmos, sparked by the apparent discovery last August of ancient microfossils in a Martian meteorite. "What a great way to celebrate America's birthday and celebrate our country's know-how and ingenuity as we press forward to new heights and new frontiers," Vice President Al Gore told flight controllers. "It's just a very exciting and historic moment." To explore the terrain, a \$25 million rover dubbed Sojourner was to creep off its mothership early today -- a few hours later than planned because of a minor snag with the air bags. [Florida Today, July 5, 1997, p 1A & 7A.]

MARS SCIENTISTS GET BY ON PEANUTS

Minutes before the Mars Pathfinder probe successfully bounced its way to a stop on Mars, the team that spent five years getting it there pulled out the space engineer's equivalent of rally caps and rabbit feet: peanuts. Just before the 1:07 p.m. landing, a jar of Planters was opened up in the second-floor windowless mission control room. For more than 35 years at NASA's Jet Propulsion Lab, engineers have relied on the peanut-eating tradition before space probe launches and landings. The only time the tradition was broken was 1993 when NASA's Mars Observer was nearing the Red Planet. The peanut provider, Dick Wallace, was out of town. The probe disappeared. NASA good-luck rituals usually involve food. Beans are served at Kennedy Space Center after space shuttle launches. [The Orlando Sentinel, July 5, 1997, p A-12.]

MIR REPAIRS POSTPONED ONE WEEK

Russian engineers Friday postponed repairs aboard the damaged Mir space station one week to give the crew and ground experts more time to practice the dangerous job. The attempt will take place July 17 or 18, not July 11 as originally planned. To get ready, a former Russian cosmonaut put on a spacesuit and plunged into a giant aquarium Friday to rehearse the work. Russian flight controllers have looked feverishly for the best way to carry out the work on the damaged Spektr module, which was punctured June 25 in a collision with a cargo ship. [Florida Today, July 5, 1997, p 7A.]

July 5: U.S. ASTRONAUTS TRAINING IN RUSSIA GET NEW CHIEF

Astronaut Brent W. Jett has been named the new NASA manager of operational activities at Star City, Russia, near Moscow. The eighth astronaut to serve in this rotational position, Jett will continue to support the training and preparations of NASA astronauts at the Gagarin Cosmonaut Training Center in Start City. The center is the Russian site of activities for NASA's joint Mir program with the Russians as well as the future international space station. Jett will be the primary liaison between NASA and Russian officials. [Florida Today, July 6, 1997, p 5E.]

NASA RENAMES LANDER IN HONOR OF CARL SAGAN

In a tribute to the late astronomer who turned on millions around the planet to the wonders of space, NASA on Saturday renamed the Mars Pathfinder lander the Carl Sagan Memorial Station. "It's very fitting," said Tony Spear, NASA's Mars Pathfinder project director. "Not only did Sagan inspire the general public, he inspired all of us rocket scientists." Spear even wondered if Sagan -- who died in December of cancer - is playing the role of guardian angel for the lander, which survived a crash landing Friday and some minor snags since then. [Florida Today, July 6, 1997, p 6A.]

July 6:

SPACE NEWS DIGEST - MORE WEB SITES

NASA's Mars Pathfinder World Wide Web sites have had more than 100 million hits in less than two days. It is almost the most popular Internet event ever, NASA officials say. A new, high-speed Web address is now available. The Pathfinder Web sites include a new 360-degree panoramic black-and-white image from Mars that you can move around. Here are some addresses:

<http://www.entertainment.digital.com/mars/JPL>

<http://mpfwww.jpl.nasa.gov>

<http://mars.sig.com/>

[The Orlando Sentinel, July 7, 1997, p A-5.]

ROBOTIC NEIL ARMSTRONG TAKES A SPIN

Like a 2-foot geologist, NASA's Sojourner rover is tooling around a Martian desert in an attempt to unearth the hidden history of a planet that once might have been warm and wet enough to harbor life. With temperatures hovering around minus 5 degrees Fahrenheit and a frigid breeze blowing from the southwest, the first motorized vehicle ever to drive on another planet set out Sunday in search of rocks nicknamed Barnacle Bill and Yogi. "She is the robotic equivalent of Neil Armstrong on Mars," rover scientist Henry Moore said. "She is there with the same sense of gratitude and awe." Astounded scientists, meanwhile, say the rover's mothership already is beaming back proof that water -- a key ingredient in the recipe for life -- once gushed across the freeze-dried plain where the Mars Pathfinder landed Friday. Under dusty salmon-pink skies, the six-wheeled rover rolled off its mothership early Sunday, creeping out onto barren Martin badlands known as Ares Vallis. Hours after it rolled down the ramp from the Mars Pathfinder lander, the tiny rover began a new era of exploration of the red planet. [Florida Today, July 7, 1997, p 1A & 4A.]

July 7:

REPAIR TOOLS READY TO ROLL INTO AILING MIR

The crew of Russia's space station Mir was to begin unloading precious cargo overnight from a newly arrived supply ship filled with necessities for the damaged outpost. It will take about two days to unpack the Progress spacecraft, which docked

successfully at Mir early Monday, putting the Russians on the track for the daunting job of reviving the outpost. The ship also carried personal items for U.S. astronaut Mike Foale, who will find a toothbrush, toothpaste and shoes among the 800 pounds of supplies. The Russian spacecraft also delivered tools and equipment needed to restore some of the electric power lost last month when another Progress supply ship crashed into the station during a test of a new, manually operated docking system. In contrast, Monday morning's docking was done with an automatic system that worked flawlessly. [Florida Today, July 8, 1997, p 1A.]

July 8: HOUSE PANEL OKS \$13.6 BILLION FOR NASA

Following in the successful tire tracks of its Mars rover, NASA's budget request for the next fiscal year cleared its own terrestrial hurdle Tuesday on Capitol Hill. The House Appropriations Committee approved a fiscal 1998 spending bill providing the civilian space agency \$13.6 billion for operating its fleet of space shuttles, continuing construction of the International Space Station and other activities. The total is \$148 million more than NASA originally requested when the Clinton administration's budget request officially was announced in February. However, it is a \$61 million reduction from the agency's current-year funding. It provides "full funding" for the shuttle and space station programs as requested, said Rep. Jerry Lewis, R-Calif., chairman of the VA-HUD appropriations subcommittee. Lewis credited NASA for being an example of a federal agency that has adapted and thrived under leaner budgets. The measure now goes to the House floor for approval. The Senate appropriations subcommittee with jurisdiction over NASA's budget is expected to vote on its recommendations July 15. [Florida Today, July 9, 1997, p 2A.]

July 9: ROVER'S DISCOVERIES THRILL MARS MISSION SCIENTISTS

Now they're getting down to the nitty-gritty science. And for the scientists overseeing NASA's Mars Pathfinder mission, the feeling is even better than the initial euphoria that surrounded the probe's Fourth of July landing on the Red Planet. "The science is just beginning, and day by day, the interpretation is getting more and more sophisticated," Pathfinder scientist Peter Smith said Wednesday at NASA's Jet Propulsion Laboratory in Pasadena, Calif. One area of interest is theories about the origins of the first Martian rock that was studied this week by the tiny rover dispatched from the Pathfinder lander. Researchers said the rock, which is speckled with holes like Swiss cheese, likely was spit out by a volcano and carried to the site by massive ancient floods. Those floods left behind larger boulders and a collection of rocky treasures the rover, called Sojourner, might visit during its mission. The surprises have the science team thrilled, project scientist Matthew Golombek said. [Florida Today, July 10, 1997, p 1A.]

STS-94 FLAWLESS AS IT PASSES HALFWAY POINT

Shuttle mission STS-94 passed its halfway point Wednesday and Columbia's astronauts are continuing around-the-clock efforts with experiments flown as part of the Microgravity Science Laboratory payload. Commander Jim Halsell and Pilot Susan Still have collected data with the Wireless Data Acquisition System (WDAS), a risk mitigation experiment to gather orbiter cargo bay temperatures and monitor if payload hardware is approaching thermal limits. Such real-time monitoring of thermal conditions for exterior payloads may be required on the International Space Station, and a system like WDAS could provide the support needed. [KSC Countdown, July 10, 1997.]

WEAK FLAMES REALLY COOL ON COLUMBIA

Scientists delighted in the uniquely weak flames burning aboard space shuttle Columbia as the laboratory mission sailed past the halfway point of its 16-day mission Wednesday. The flames could shed light on how to build more fuel-efficient, cleaner-burning automobile engines, said Paul Ronney, a professor of mechanical engineering at University of Southern California in Los Angeles. Columbia's astronauts are igniting a variety of gases for Ronney's combustion experiment, including tiny amounts of hydrogen and oxygen. Such small mixtures would not be flammable on Earth, but in the weightlessness of space some of them burned for more than eight minutes, NASA project scientist Karen Weiland said. Because heat does not rise in weightlessness, it tends to stay around the flame, causing the flame to take the shape of a ball, she said. [The Orlando Sentinel, July 10, 1997, p A-6.]

WILL THE PEOPLE ON MARS BE MAD ABOUT REISER'S SONG?

The them song *Mad About You*, from the television series of the same name, was transmitted by NASA scientists this week to "wake up" the Sojourner rover. Paul Reiser, who wrote the song, is "totally bewildered and tickled" that his song made its way to Mars. "When you're writing a song, you never think, 'Boy, this'll sound great on Mars!'" Reiser said. [The Orlando Sentinel, July 10, 1997, p A-6.]

MERGING LAUNCH TEAM TRIMS JOBS

The merging of support service contracts at Patrick Air Force Base and Kennedy Space Center next year could cost jobs in the short term, base officials said. But long-term prospects are far rosier as a result of the consolidation, with both agencies becoming more competitive in the international commercial space launch race. "The consolidation will make us more international competitive," said Ed O'Conner, executive director of Spaceport USA, an independent state agency that promotes commercial space. "Saving money is the same as increasing capacity." The contract

is valued at \$250 million a year for 10 years, and covers services such as air conditioning and ground maintenance and even some launch operations. The two agencies are hammering out details, but if approved, the contract would be effective Oct. 1, 1998. The contract would cover KSC, Cape Canaveral Air Station and certain functions at Patrick. A request for proposals should be issued in March 1998, officials said. KSC currently employs EG&G Florida for its services, which includes everything from pulling wires and air conditioning services to launching rockets. Patrick would eliminate 19 contracts during the next five years under the planned merging of services. The Air Force pays about \$100 million a year for its 19 contracts, while NASA pays a bit more, said Judy Casper of EG&G. Ken Winslette, director of contract operations at Patrick, said Patrick shells out about \$465 million each year for contractor services overall. Casper said EG&G manages between 2,300 and 2,400 people, while the Air Force employs about 2,500 contracted workers. The size of the new work force will be determined by the winner of the contract. Lt. Col. John Martin, a Patrick spokesman, said the firm that wins the contract would make personnel decisions, not the Air Force or NASA. The expectation is, however, that some jobs would be lost. "Combining these requirements will almost certainly mean a decrease in management staffs," he said. "However, it would be sheer speculation to apply personnel numbers to this initiative at this point." Winslette said that if government agencies want to remain competitive in the commercial launch market, this type of consolidation is necessary. [Florida Today, July 10, 1997, p 4A.]

AXAF TELESCOPE, SPACECRAFT ON TRACK FOR INTEGRATION IN OCTOBER

TRW spacecraft engineers here are on track to integrate the huge x-ray telescope at the business end of NASA's Advanced X-ray Astrophysics Facility (AXAF) with the all-graphite satellite bus that will move it around. Ed Wheeler, AXAF program manager for TRW said the two large structures will be mated in October, shortly after Ball Aerospace ships the orbiting observatory's instrument module from Boulder, Colo. TRW has already reserved a special large-satellite carrier owned by Lockheed Martin to ship the 10,000-pound, 46-foot spacecraft to Kennedy Space Center. AXAF is down for launch aboard the Space Shuttle Columbia on Aug. 28, 1998, with an inertial upper stage attached to boost it into the highly elliptical orbit it will occupy to probe the x-ray spectrum away from the blocking effects of the earth's atmosphere. In its final, deployed configuration the AXAF will resemble the Hubble telescope, with solar arrays spanning 64 feet. [Aerospace Daily, July 9, 1997, p 3. Aerospace Daily, July 11, 1997, p 10.]

July 10:

SPEEDING ROVER COLLIDES WITH ROCK

The Mars rover hit the rock, named "Yogi" by space scientists, as it was backing up and maneuvering itself to position its alpha proton X-ray spectrometer against a flat surface. It was moving too fast and its left rear wheel rode up on the rock. Its

onboard computers, sensing the collision, immediately brought it to a stop, said Richard Cook, Mission Manager. [The Orlando Sentinel, July 11, 1997, p A-6.]

CONTRACTORS ABANDON 'GYPSY' SITE

The future of the Joint Industry Press Center (abbreviated JIPC and pronounced "gypsy") at Kennedy Space Center's press site is unknown. It's closed. Carole Edson, longtime JIPC manager, cleaned out its storeroom after STS-94's launch on July 1. The JIPC began in the 60's for Apollo launches. Aerospace public relations reps dispensed information mostly from Cocoa Beach motels. Janet Bonder, then with Planning Research Corp., said that with NASA encouragement, "the contractors decided to rent trailers to go outside the press dome," about three miles from the Complex 39 launch pads. The first trailer, for STS-3 in March '82, was small. For STS-5 in November, a double-wide trailer was in place. After the Challenger disaster, the trailers were removed. In late 1988, the JIPC reopened in a fancy, modular facility housing 20 contractors. The atmosphere was more formal. David Mandernack, with Boeing's Rocketdyne Division, is president of the JIPC board. He said, "Our contract with the management firm of CCI (Communications Concepts Inc.) ends July 17. We're going to move in with NASA and become true gypsies in the press center. 'We'll change from 'Joint Industry Press Center' to 'Joint Industry Press Corps.' We'll still call it JIPC. The JIPC is not going away, the building is." [Florida Today, Salamon, July 11, 1997, p 9A.]

July 13:

SPACE MISSION ENCORES PLAY THIS WEEK

It's hard to top a week that featured a successful exploration of Mars, but this week in space promises plenty of drama of its own. Sometime late Thursday (July 17), the crew of the banged-up Russian space station Mir is expected to try a dangerous spacewalk to repair damage caused during a June 25 collision with a cargo ship. The Mars Pathfinder mission continues as the probe's rover seeks out rocks that could help scientists determine whether the planet once could have been home to life. And not to be forgotten, NASA plans to end shuttle Columbia's 16-day research mission with a 6:53 a.m. landing Thursday at Kennedy Space Center. "This is going to be another busy week for us," said Bruce Buckingham, a NASA spokesman at Kennedy Space Center. "Especially as we get to Thursday and have the Mir spacewalk and the Columbia landing happening on the same day." Although the Mars mission riveted the world last week, the Mir repairs will move to the center of attention because the future of the 11-year-old station might hinge on the outcome. Mir lost nearly half of its electrical power in the accident. NASA officials have said they might not send more American astronauts to the outpost unless it can be fixed. [Florida Today, July 14, 1997, p 1A & 3A.]

July 14:

HEART TROUBLE ABOARD MIR

Two cosmonauts are expected to rehearse a risky spacewalk aboard Russia's crippled Mir space station, but the ship's commander is having heart problems that could stall the vital repair job. Cosmonaut Vasily Tsibliyev told flight surgeons Monday that he experienced an irregular heartbeat during a ride on an exercise bike and while trying to sleep Friday. Tsibliyev, 43, blamed the problem on stress in the wake of a June 25 cargo ship collision that cut station power by half and severely damaged one of Mir's six laboratories. "Will I be able to make the trip?" Tsibliyev anxiously asked a Russian flight surgeon, referring to a spacewalk planned for Friday to try to restore the station's power. The doctor prescribed more rest and sleep and told Tsibliyev not to take any medication until his condition was more thoroughly diagnosed. Tsibliyev and flight engineer Alexander Lazutkin plan to don bulky spacesuits Friday and squeeze into the Spektr lab, which was punctured and depressurized when an 8-ton cargo ship crashed into Mir. The two cosmonauts are to install a custom-made hatch that will enable them to hook up power cables and route electricity from three undamaged Spektr solar panels to the rest of the outpost. The power cables were disconnected in a scramble to seal off the Spektr lab after a breach in its hull threatened to suck all the air from the aging station. U.S. astronaut Michael Foale will be stationed in a Soyuz spacecraft during both the practice run and the real spacewalk repair job. [**Florida Today**, July 15, 1997, p 1A & 6A.]

SHUTTLE EXPERIMENTS ON TRACK

Shuttle Columbia's astronauts spent Monday paving the way to NASA's planned international space station while colleagues on the ground moved sistership Discovery to its Kennedy Space Center launch pad. Circling 184 miles above Earth, Columbia's crew pressed ahead with science experiments aimed at developing advanced metal alloys and new medicine to flight human disease. A similar array of work is to be carried out on NASA's \$40 billion international station, which is to be raised in orbit between mid-1998 and the end of 2003. Columbia's crew is carrying out 33 science experiments in a trailer-sized cargo bay laboratory. Launched July 1 on a rerun of a research mission cut short by a fuel cell failure in April, the crew is scheduled to land back at KSC at 6:53 a.m. Thursday. Shuttle Discovery, meanwhile, made a 3.5 mile move to its launch pad where the spaceship is being readied for a planned Aug. 7 launch on an 11-day space science mission. [**Florida Today**, July 15, 1997, p 6A.]

July 15:

MARS PATHFINDER WEB SITE

A preliminary analysis of Mars Pathfinder World Wide Web sites indicates a steady stream of 45 million hits per day following the NASA spacecraft's landing on the Red Planet July 4. On landing day, the KSC site alone covering the event took approximately 2.5 million hits and has experienced to date about 14 million hits total on Mars Pathfinder information. The primary KSC site is located at

<http://www.ksc.nasa.gov/mars/default.html> Between the transfer of video, photos, and text, KSC has released around 228 terabytes of data on the Mars activities. The Mars Pathfinder Project home page at <http://mpfwww.jpl.nasa.gov/> has 24 mirror sites around the world to try to provide quick access to information to its global audience. [KSC Countdown, July 15, 1997.]

NEW CREW MAY TAKE RISKY WALK

Crucial repairs to the Mir space station may be carried out by a fresh crew next month to avoid saddling a possibly ailing Russian commander with the job. Or U.S. astronaut Michael Foale could be pressed into service to do the dangerous work, which will involve spacewalking into an airless laboratory to restore electricity to the power starved station. That was the word from U.S. and Russian officials Tuesday as a dress rehearsal for the repair operation abruptly was called off. "There is no date for the practice and no date for the real thing because the Russians are currently giving Tsibliyev time to rest," said NASA spokesman Rob Navias at Johnson Space Center in Houston. [Florida Today, July 16, 1997, p 1A.]

PBS SPECIAL TRACKS SHUTTLE PREPARATIONS OVER A YEAR

They're all men of science and sage. Experienced pilots, scholarly engineers and a medical doctor. Now pit all their schooling against a 12-story spaceship that is fully fueled and ready to carry them into orbit. Watch how science mixes with superstition every time a U.S. space shuttle waits for its astronauts at Kennedy Space Center. "It's almost like (the shuttle) is alive when you come out here on launch day," commander Brian Duffy says. Duffy led a five-man crew aboard shuttle Endeavour in 1996 on a mission to retrieve a Japanese satellite. Before they left Earth, the astronauts led a PBS crew through their year's worth of training for the flight. The results is "Astronauts," which premieres today at 9 p.m. on PBS. The hour-long documentary gives a whirlwind tour of the preparations for flight and a taste of the anxious excitement that surrounds the mission. It also gives glimpses behind the scenes of NASA life, where astronauts faithfully follow good-luck traditions on launch day before getting strapped inside their ship. First there's the card game Possum's Fargo. The shuttle commander must be dealt a losing hand. Then there's the formal send-off from the KSC kitchen staff, who must be poised in their doorway to say goodbye before the crew can leave. Lastly, there are the beans that family members and NASA friends must eat once the crew is in orbit. No matter if it's 4 o'clock in the morning. Dig in. But the superstitions aside, the film shows how the crew and their loved ones put their trust in technology each launch day. Yet the film lets you see -- by sitting in on wives' conversations -- that anxiety precedes every launch and landing. It also gives an inkling of why the men and families put up with the risk. As astronaut Cady Coleman said to rookie flier Koichi Wakata: "I feel like I know a secret. I've been to a special place. When you ask all the people who've flown before what it was like, they just get a certain look in their eyes. Now I know what they're thinking."

[Florida Today, July 16, 1997, p 1D.]

July 16:

RUSSIA SIDELINES MIR COMMANDER
-- AMERICAN TO PREP FOR REPAIR JOB

Russian space officials Wednesday declared the commander of the Mir space station unfit for a grueling repair job and said a U.S. astronaut would begin training to replace him. However, NASA officials said it was premature to say astronaut Michael Foale would participate in the delicate mission into the sealed-off Spektr module that was punctured last month in a collision with a cargo ship. A decision likely would be made within a few days. [The Orlando Sentinel, July 17, 1997, p A-1.]

HOUSE VOTES TO KEEP EXTRA MONEY
IN NASA BUDGET FOR STATION

House members agreed Wednesday to protect NASA from further financial setbacks caused by Russia's inability to deliver crucial parts for the International Space Station. By a vote of 227 to 200, lawmakers defeated an amendment to eliminate a \$100 million contingency fund the space agency had requested as a financial fail-safe against future Russian-caused delays to the \$17.4 billion, multinational space station project. The additional money will protect the fragile international partnership involved in the space station's construction, said Rep. Jerry Lewis, R-Calif., chairman of the Veterans Affairs, Housing and Urban Development and Independent Agencies appropriations subcommittee. For the first time since 1993, Rep. Tim Roemer, D-Ind., did not offer an amendment to cancel space station funding. [Florida Today, July 17, 1997, p 4A.]

LAUNCH OF NATIONAL RECONNAISSANCE
OFFICE SATELLITE DELAYED

The launch of a National Reconnaissance Office (NRO) satellite has been delayed indefinitely after nitrogen tetroxide leaked from the Titan 4A booster that was to orbit it. The U.S. Air Force said about 230 gal. of the fuel oxidizer leaked from the Titan 4 into holding tanks on July 16, forcing the evacuation of more than 40 people working near Space Launch Complex 4 at Vandenberg AFB, Calif. The launch of the reconnaissance payload, believed to be an imaging-type satellite, had already been delayed a day due to a Titan inertial measurement unit (IMU) problem. The mission is now on hold pending an investigation into the cause of the leak. Meanwhile, an IMU problem has also delayed the Titan 4A launch of an NRO sigint/elint-type satellite from Cape Canaveral until late-August. [Aviation Week & Space Technology, July 28, 1997, p 48.]

July 17:

SPACE SHUTTLE COLUMBIA LANDS

Space shuttle Columbia and its crew of seven returned to Earth in quiet triumph today with a bounty of laboratory research on fire, metals and plants. NASA's oldest shuttle soared through a clear, flushed sky and touched down just after sunrise at Kennedy Space Center following a mission lasting 15 days and 16 hours. "Congratulations on a perfect mission," Mission Control said after Columbia rolled to a safe stop. A crowd of a few hundred gathered at the runway. The space shuttle landed on orbit 251 having traveled 6.2 million statute miles. After KSC ground crews complete safing and post flight activities, Columbia will be transported to Orbiter Processing Facility bay 2 later today. NASA mission manager Teresa Vanhooser said she wasn't disappointed that the research was beaten in the news by the Mars Pathfinder and the crippled Mir. "I'm sure that when the papers come out in all the scientific journals that they'll get their due respect," she said. NASA's next shuttle flight: a research mission by Discovery in August. [Marcia Dunn. (1997). **Washington Post** [Online]. Available: washingtonpost.com [1997, July 17]. Bruce Buckingham. (1997). **Kennedy Space Center Space Shuttle Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [1997, July 17].]

ANOTHER ERROR SPARKS SCARY DAY FOR MIR CREW

The crew of the hobbled Mir deepened their own trouble Thursday with a very down-to-earth error, pulling the wrong plug and shutting down most of the space station's already disabled power system. The mistake sent the Mir askew and on a dark, twisting ride through space for hours, initially cut off from contact with Earth. Its crew was forced to use the Soyuz escape capsule to steer the station until they could begin to unravel the foul-up. The Mir is expected to be back in normal operation today. [**The Orlando Sentinel**, July 18, 1997, p A-1&A-9.]

PATHFINDER ENGINEERS SOLVE SOFTWARE PROBLEM

NASA engineers have solved the software problem that caused several resets of the overloaded Mars Pathfinder computer and slowed transmission of pictures and other data to Earth. The engineers will radio up the software change on Saturday, project manager Brian Muirhead said Thursday. In the interim, they'll continue to have the computer perform tasks one at a time, which so far has averted resets like those that slowed down the project on July 10 and 11 and again early Monday, July 14. [**Florida Today**, July 18, 1997, p 2A.]

July 18:

REPLICA BUILDER SPACES OUT

Years before astronauts live and work on the international space station, visitors to the Kennedy Space Center Visitor Center will walk through space-station replicas built by a Central Florida company. Guard-Lee Inc., based north of Orlando near Apopka,

builds aviation replicas and has been awarded a nearly \$1 million contract to construction replicas of parts of the space station. Andy Hunold, exhibit coordinator for NASA's Kennedy Space Center, said Friday that the exhibits will join other displays at the visitor complex. "We certainly hope to have it by the end of the year," Hunold said. Guard-Lee earlier built a full-size replica of a space shuttle orbiter and other displays for the NASA visitor center. It recently completed an Apollo capsule for the HBO series *From the Earth to the Moon*, being filmed at Disney MGM-Studios in Orlando. Construction on the real international space station, originally scheduled to start this year, recently was postponed until 1998 as concerns about Russia's ability to pay its share increased. If the orbiting laboratory is completed around 2003 as planned, it will stretch about the length of two football fields. Total cost is estimated at \$40 billion, with the United States contributing about \$29 billion. More than a dozen nations are participating. Delaware North Parks Services of Spaceport Inc., which operates the visitor center under contract with NASA, is paying for the replicas as part of an expansion of the center. No NASA money is involved in building the replicas. Delaware North consultant Hal Row said some of the replicas will be full-scale -- to show where astronauts will live, for example. The 10 replicas -- four of them full-scale -- will be part of the Space Station and Future Enterprises exhibit, said Tom Wilkes, vice president for operations for Guard-Lee. The exhibit will be connected by a walkway to a building where components of the real space station will be stored and worked on before being flown into space. [The Orlando Sentinel, July 19, 1997. p C-9.]

NASA STATEMENT ON THE PASSING OF GENE SHOEMAKER

Planetary scientist Dr. Eugene ("Gene") Shoemaker, 69, was killed in a two-car accident near Alice Springs, Australia, on the afternoon of July 18. His wife Carolyn Shoemaker suffered broken bones and reportedly is hospitalized in stable condition. A geologist by training Shoemaker is best known for discovering, with his wife Carolyn and colleague David Levy, a comet near Jupiter. Comet Shoemaker-Levy 9 was broken up by tidal forces from Jupiter, and its fragments collided with the planet in July 1994. Together, the Shoemakers were the leading discoverers of comets this century. [NASA News Release #97-156, July 19, 1997.]

July 19:

MIR CREW GETS DISAPPOINTING NEWS: NEXT CREW TO DO REPAIRS

Mir's crew members got disappointing news from Earth on Saturday: They won't get a chance to repair the seemingly jinxed Russian space station. Instead, the tricky fix-it job will be left to a fresh Russian crew set to blast off next month, leaving the aging Mir to creak along at half-power until then, Russian space officials said. [Florida Today, July 20, 1997, p 6A.]

CASSINI CAMP EDUCATES PROTESTERS

With the launch date approaching, opponents of a plutonium-laden NASA probe will descend on Brevard County this week to distribute information and demonstrate against the Cassini mission to Saturn. Organizers estimate 100 people will take part in the weeklong "Cassini Camp," which will culminate Saturday with a demonstration at Cape Canaveral Air Station. During the week, activists will protest at the air station, Kennedy Space Center and Patrick Air Force Base. They also plan to distribute information door to door in the Port Canaveral and Cape Canaveral areas. The opponents believe the flight is dangerous because the probe will carry 72 pounds of plutonium inside protective canisters. Through the natural process of decay, the plutonium generates heat that is converted into electricity to run Cassini's science instruments during a four-year study of Saturn and its moons. Critics fear the radioactive plutonium could be released in a launch accident or when Cassini zooms by earth in August 1999, using the planet's gravity to help slingshot it toward its distant target. NASA puts the chances at 1 in 1,490 that an accident could release the plutonium during liftoff. Chances are less than 1 in 1 million that such an accident could occur during the Earth flyby. [Florida Today, July 20, 1997, p 1B&2B.]

July 20:

TALK ABOUT A SATELLITE CAMPUS...

The Astronaut Memorial Foundation -- A Kennedy Space Center-based education facility -- is embarking on building a \$1.2 million hands-on lab that will be a practical prototype of future education. The classroom, which will include 150 interactive work stations, will re-create space environments -- including Mars -- for students, teachers and tourists visiting the center, said James DeSantis, foundation president. Preliminary designs of the classroom in space show that students of varied ages will learn in pod-like computer stations. The 150 stations will allow visitors to work on science, space and math-related problems. It also will allow participants to access resources throughout the world via the Internet. Plans to create "Classroom in Space" software also would allow students at Kennedy Space Center to interact with others around the world. [Florida Today, July 21, 1997, p 1A.]

BUILDING LOVE NESTS FOR STORKS

Biologists are making a serious pitch to lure endangered wood storks to nest at the Merritt Island National Wildlife Refuge. Biologists have built 25 artificial nests around a restricted area of Moore Creek, hoping the refuge -- already a stork hangout -- will become a viable rookery to help the birds recover from the brink of extinction. The project is part of a more concerted effort biologists in the Southeast are making to protect the birds, which were put on the federal endangered species list in 1984 and are showing only limited signs of recovery. The threat of human interaction is a big reason why Merritt Island Refuge officials want the birds to nest at secluded Moore Creek -- which annually produced about 150 nests during the 1970s and much of the

1980s. In 1977, the site had 325 nests and 880 chicks, but there hasn't been a viable rookery anywhere in the refuge since 1990. To lure the storks, they've stuck 25, 12-foot wooden poles into the creekbeds and adorned the top of each with a 4-foot-wide nest made of sticks -- more than big enough to hold two, 6-pound adults and their young. In two of the nests, they've placed a pair of wooden decoys and planted six in the shallows to represent feeding storks. Biologists say they think that if one pair returns, a second, third and fourth will certainly follow, because the birds nest in groups. [Florida Today, July 21, 1997, p 1A&2A.]

July 21:

PATHFINDER TALKING TO NASA AGAIN

Communications between the Mars Pathfinder and NASA were restored Monday, clearing the way for scientists to begin receiving data from the Red Planet for the first time in two days. Relieved mission controllers replied to the lander's transmissions by ordering it to begin sending the information with its low-gain antenna. A session using the high-gain, or high-speed, antenna was to follow. Scientists had last received a signal from the probe at 4 a.m. Sunday, and it was weaker than expected and provided no science data. Then no signal was heard during a session scheduled for three hours later. Both the lander and its rover, Sojourner, were believed to be healthy said project Manager Brian Muirhead at NASA's Jet Propulsion Laboratory in Pasadena. The rover is still safely parked at a whitish rock nicknamed Scooby Doo. [Florida Today, July 22, 1997, p 4A.]

CANAVERAL SEASHORE LOSES CHIEF

The Canaveral National Seashore superintendent will leave his post in September, prompting U.S. Rep. Dave Weldon to accuse the Clinton administration of forcing out Wendell Simpson for his stance against nudity at Playalinda Beach. National Park Service officials announced Monday that Simpson applied for and was selected to become the new superintendent at Natchez Trace Parkway, within the states of Mississippi, Alabama and Tennessee. No replacement has been named. [Florida Today, July 22, 1997, p 1A.]

MOVIE EXTRAS THINK THEY MADE 'CONTACT'

Nearly 230 people spilled into the Atlantic Cinema to catch a glimpse of much less than 15 minutes of fame at the "contact" extras cast party. More than 1,000 Brevardians appeared as extras in the summer blockbuster starring Jodie Foster, said Brevard Talent Group owner Tracey Danielle. Danielle was responsible for supplying the movie's Kennedy Space Center backdrop with most of the extra talent. The movie, which lasts 2 ½ hours and opened July 11, was filmed partly on location at Kennedy Space Center. However, the segments in which KSC appears are brief. [Florida Today, July 22, 1997, p 1D.]

July 22:

NUDISTS FEAR PLAYALINDA BAN ONLY THE START

Federal park rangers patrolling Brevard County's Playalinda Beach soon won't be able to look the other way when nude sunbathers hit the shore. The Senate Appropriations committee today is expected to approve a measure that prevents the U.S. Parks Service from setting aside part of the Canaveral National Seashore for nude sunbathing. The House last week overwhelmingly approved the measure, proposed by U.S. Rep. Dave Weldon, R-Palm Bay, who said he merely wants the federal government to respect Brevard County's anti-nudity ordinance. [The Orlando Sentinel, July 22, 1997, p A-1.]

**SHUTTLE HAS OUTLIVED USEFULNESS;
TIME TO REPLACE IT, OFFICIAL SAYS**

NASA's workhorse space shuttle have served the country well, but now it's time to replace them, Rep. Dana Rohrabacher, R-Calif., said at a space symposium Tuesday. The congressman, addressing a variety of space issues, also told the group NASA should step back from planning a manned mission to Mars. "The shuttle is something we can be proud of," the chairman of the House Space subcommittee said. "But it is not a space transportation system we can afford. It is old technology, and it is time we move on." NASA should invest more in fostering replacements, Rohrabacher said. One such effort -- the X-33 "Venture Star" -- is being developed by Lockheed-Martin. In fact, many want NASA out of the launch business, buying its launch services from future private providers. But that is unlikely to happen soon. The agency's timeline calls for the shuttle to remain NASA's primary delivery system through 2012, officials said. [Florida Today, July 23, 1997, p 4A.]

LOCKHEED MARTIN LAUNCHES FIRST GPS IIR SATELLITE

The first Global Positioning System satellite built to the class IIR configuration was launched late Tuesday from Cape Canaveral Air Station on a McDonnell Douglas Delta II rocket. Liftoff came at 11:43 p.m. EDT, putting the satellite into its proper orbit. [Aerospace Daily, July 24, 1997, p 5.]

July 23:

MIR'S POWER COULD DECIDE U.S. PRESENCE

A decision on whether to send another American to the troubled Mir space station hinges on whether the craft's damaged electrical system can be repaired, President Clinton's top science adviser said Wednesday. Mir lost half its power after its Spektr module was punctured in a collision with a cargo ship June 25. A new Russian crew is being sent up to the station Aug. 5 to repair the damage. American astronaut Michael Foale is expected to stay on Mir until mid-September when he is scheduled to be picked up by shuttle Atlantis. His replacement, astronaut Wendy Lawrence, is to be dropped off on that flight. A decision will be made by NASA after repairs are

made late next month whether to replace Foale or to simply bring him back to Earth. [Florida Today, July 24, 1997, p 8A.]

July 24: KSC VISITOR COMPLEX GETS NEW NAME AND LOGO

The KSC Visitor Complex (KSCVC) recently unveiled a new logo as well as a name change. "We've been calling ourselves the Kennedy Space Center Visitor Center," says Rick Abramson, President and Chief Operating Office, Delaware North, "but we didn't think the words 'visitor center' properly communicated the breadth of the experience here. With the new logo came an opportunity to make a change. The new logo has a crisp, modern and lively look that reflects the changes taking place at the Visitor Complex." The Visitor Complex opened the \$37 million Apollo/Saturn V Center last December, and is currently constructing two new attractions slated for openings in December 1997 -- the International Space Station Center and the Launch Complex 39 Observation Gantry. The KSCVC is one of Florida's five most visited attractions. [KSC Countdown, July 24, 1997.]

AUGUST 7 SELECTED FOR STS-85
SPACE SHUTTLE MISSION LAUNCH

Space Shuttle Program managers today set August 7 as the launch date for the next Shuttle mission, to deploy and retrieve a science satellite and test a small robotic arm identical to one that will be used on the International Space Station's Japanese Experiment Module. The launch window for Space Shuttle Discovery extends for one hour, 39 minutes from 10:41 a.m. to 12:20 p.m. EDT. Nominal flight duration is 10 days, 20 hours, 24 minutes, putting the landing on Monday, August 18, at 7:05 a.m. EDT. Discovery's crew, made up of Commander Curt Brown, Pilot Kent Rominger, Mission Specialists Jan Davis, Robert Curbeam and Steve Robinson and Canadian Payload Specialist Bjarni Tryggvason, will deploy the CRISTA-SPAS spacecraft for nine days of free-flying atmospheric studies and demonstrate the operational capability of the Japanese Remote Manipulator System and its Small Fine Arm. [NASA News Release #97-159, July 24, 1997.]

SPACE STATION'S COST OVERRUNS AT \$307 MILLION

NASA Administrator Daniel Goldin on Thursday tried to assuage skeptics concerned with problems at both the crippled Mir space station and the International Space Station that is under construction. Goldin conceded at a Senate hearing that \$291 million in cost overruns at the new station had grown to \$307 million in the month since he last testified before Congress. And the red ink likely will continue to increase for the next three to six months. But Goldin defended sending U.S. astronauts to the beleaguered Mir. He said he will decide two days before the next launch whether to send a U.S. astronaut aboard Mir, a Russian-owned orbiting sky lab beset by technical problems lately. Goldin said the decision will be based on astronaut

safety and how much can be learned that will be applied to the International Space Station. [The Orlando Sentinel, July 25, 1997, p A-4.]

July 25:

SECOND U.S. SPACE STATION COMPONENT BEGINS LAUNCH PREPARATIONS

The first of two pressurized mating adapters for the International Space Station arrived today at the Kennedy Space Center from manufacturer McDonnell Douglas in Huntington Beach, CA. A pressurized mating adapter is a cone-shaped connector that will be attached to Node-1, the space station's structural building block, during ground processing in Kennedy's Space Station Processing Facility. Node-1 with the adapter attached will be the first element of the Station to be launched aboard the Space Shuttle in July 1998. The mating adapter will be the connection point between Node - 1 and the U.S. financed, Russian-built Functional Cargo Block, which will be launched from Russia as the first Station element to be placed into orbit. the adapter will house Space Station computers and various electrical support equipment and eventually will serve as the passageway for astronauts between the node and the cargo block. "PMA-1 brings with it the computers that are the intelligence for the node," said Glenn Snyder, Space Shuttle mission STS-88 payload manager. "We're looking forward to testing with those computers." For processing at Kennedy, the adapter will undergo initial acceptance testing. Then, in early September, it will be mated to Node-1 and a series of integrated tests will be conducted. The second adapter, the final element of the STS-88 mission, is expected to arrive at Kennedy this October. It also will be attached to Node-1 in the processing facility. This second adapter will serve as a Space Shuttle docking port during the construction and resupply of the Space Station. The asymmetrical open-ended cone-shaped pressurized mating adapters are about seven feet long, five feet in diameter at one end and nine feet in diameter at the other. Each adapter consists of five individually machined and welded aluminum ring forgings, thermal insulation blankets and 52 fittings for electrical connections. The outer covering is a double-walled aluminum sheet to protect the adapters from strikes by space particles. Space Shuttle Endeavour, carrying Node-1 with the two attached adapters, is targeted for launch in July 1998, approximately two weeks after the Functional Cargo Block is launched from Russia. [NASA News Release #97-160, July 25, 1997.]

ATLAS 2A LAUNCH SCRUBBED AFTER TECHNICAL GLITCH

A Lockheed Martin Atlas 2A rocket scheduled for liftoff Friday night was scrubbed after a technical problem stymied mission controllers. They will try again tomorrow (July 26). The launch window is 8:54 p.m. to 9:34 p.m. The rocket will carry a \$100 million Japanese communication satellite into orbit. The problem involved the hold-down release system, the part of the launcher which the rocket sits on top of. [Florida Today, July 26, 1997, p 2A.]

July 26:

200 PROTEST CASSINI MISSION AT CAPE CANAVERAL

Their fear is that radioactive plutonium could be released when the Cassini mission to Saturn is launched Oct. 6, either in a launch accident or when Cassini zooms by Earth in August 1999, using the planet's gravity to help slingshot it toward its distant target. About 200 protesters who camped out Saturday in front of Cape Canaveral Air Station, first in searing heat and then under the shadow of a looming thunderstorm, hope to rally public support for canceling the mission. While many of the demonstrators said they do not oppose space exploration, they say they do resent being placed at risk. [Florida Today, July 27, 1997, p 2B.]

ATLAS LAUNCH DELAYED AGAIN

The launch of an Atlas 2A rocket from Cape Canaveral Air Station was scrubbed Saturday for the second time in as many nights. Thunderstorms were the culprit this time, following Friday's scrub for a technical problem. The next attempt has been scheduled for July 27, with a launch window of 8:53 p.m. to 9:34 p.m. The Lockheed Martin Atlas 2A rocket is scheduled to lift the \$100 million Superbird-C communications satellite into orbit for Space Communications Corp. of Japan. [Florida Today, July 27, 1997, p 4A.]

EAGLES SOON MAY COME OFF ENDANGERED LIST

The number of bald eagles nesting in Brevard County and Florida continued to rise this spring. And that's part of the reason biologists for the first time are considering taking the bird off the federal endangered species list. That would be a monumental step for the bird, which faced extinction 30 years ago. The bald eagle became a symbol for wildlife preservation when it was one of the first animals to be protected under the federal act in 1973. This spring, 873 nests in Florida produced a record 1,216 fledglings. Brevard had a record 37 nests for the second consecutive year, producing a record 49 fledglings. Although Florida's birds were not in as bad shape as those in other states, they benefited from the protection. [Florida Today, July 27, 1997, p 1A.]

OFFICIAL: SEASHORE CHIEF WAS PROMOTED

Wendell Simpson, Canaveral National Seashore superintendent, is leaving the park because he was promoted, not because of any back room political deal brought on by controversy over nude sunbathing, a National Park Service spokesman said. A week after the House passed legislation banning clothing-optional signs at Playalinda Beach, the park Service announced last week that Simpson would be transferred to Natchez Trace Parkway in Mississippi. The move is a promotion and nothing more, said Paul Winegar, a spokesman for the National Park Service's Southeast Region. [Florida Today, July 27, 1997, p 1A.]

July 27:

**ATLAS IAS LIFTS SUPERBIRD-C TO
SUPERSYNCHRONOUS TRANSFER ORBIT**

A Lockheed Martin Atlas IAS booster launched Japan's Superbird-C communications satellite from Cape Canaveral Air Station Sunday night after two earlier attempts over the weekend were scrubbed, once for ground equipment problems and once for weather. Liftoff came at 9:15 p.m. EDT, from Complex 36B, and the spacecraft separated from the launch vehicle as planned 33 minutes later. Weighing 6,902 pounds at launch, it will join Superbirds A and B providing broadcast and business communication across Asia. [Aerospace Daily, July 29, 1997, p 7. Aviation Week & Space Technology, August 4, 1997, p 23.]

July 28:

RUSSIANS THINKING ABOUT MIR'S RETURN TO EARTH

Even if it is fixed next month, the crippled space station Mir eventually will fall back to Earth. Russian officials are planning for that day and think they can keep people from being hit by the remnants of the 154-ton station that will not burn up in the atmosphere. But the Russians and NASA don't have a good track record controlling space equipment that's coming down to Earth. In the past that has meant scares for Australia, South America and Canada. Mir, which has a dead lab and has been running on half-power since a June 25 collision with a resupply ship, is expected to be abandoned in about two years when NASA gears up its international space station. Once it is abandoned, Mir will run out of fuel and succumb to Earth's gravity. But that day could happen much sooner if problems continue on the 11-year-old station. Russia looked at dismantling the station while in orbit but decided it was easier to guide it to Earth in one piece. Even though the planned international space station isn't in orbit yet, NASA will be watching what happens with Mir. NASA will have to deal with a similar problem decades from now when it will be the new station's turn to fall back to Earth. "It will be a version of the same thing that's planned for Mir," NASA spokesman James Hartsfield said. [The Orlando Sentinel, July 29, 1997, p A-4.]

**RUSSIAN SPACE OFFICIALS GIVE MIR
COMMANDER MEDICAL OK**

Russia's Mission Control lifted all medical restrictions Monday on the commander of the Mir space station, whose heart problems helped delay needed repairs aboard the orbiting spaceship. Commander Vasily Tsibliyev will continue to take some medication, but is no longer restricted to low-stress physical activity, said Valery Lyndin, a spokesman for the Russian Space Agency. The two Russian cosmonauts aboard Mir prepared Monday for their Aug. 14 homecoming, while American astronaut Michael Foale worked on scientific experiments. [Florida Today, July 29, 1997, p 6A.]

190 JOBS ELIMINATED AT KSC

EG&G Florida will lay off 190 workers at Kennedy Space Center on Sept. 5, company officials said Monday. EG&G, which holds the base operations contract at Kennedy Space Center, employs 1,700 workers and 500 sub-contract employees. The job cuts, which are expected to affect both groups of workers, will be determined within the next few weeks. Some reductions will be made through voluntary resignations, job-sharing and retirements. EG&G is making the reduction because of NASA budget cuts. "During the past three fiscal years -- including fiscal 1998, which begins Oct. 1 -- our budget has been reduced by in excess of \$20 million," company spokeswoman Judy Casper said. "We were able to avoid layoffs during the past two years through attrition and other means, but we can't do that for the coming year." The reduction is unrelated to the planned merger of support service contracts at KSC and Patrick Air Force Base next year, Casper said. That merger is expected to cause additional layoffs. [Florida Today, July 29, 1997, p 1A.]

July 30:

WOLF REPLACES LAWRENCE ON NEXT MIR CREW

NASA pulled Astronaut Wendy Lawrence from her upcoming long-duration mission to Mir because she cannot wear the Russian "Orlan" spacesuit that would allow her to backstop her cosmonaut crewmates on spacewalks to repair the crippled space station. Astronaut David Wolf, Lawrence's backup, will take her place. Because Wolf has not completed extravehicular activity (EVA) training at the Star City cosmonaut center near Moscow, launch of the Space Shuttle Atlantis mission 86 on its next trip to Mir may be delayed about 10 days from its Sept. 18 target, NASA said. The Orlan suit does not fit Lawrence, who was certified by her Russian trainers just yesterday for a four-month stay on Mir. Frank Culbertson, head of the Shuttle/Mir portion of the International Space Station program, said the shift was made because the June 25 collision between Mir and a supply capsule changed the mission requirements. Culbertson, who is in Russia, told Lawrence of the "joint decision." The 38-year-old Navy commander will make the September Shuttle flight to Mir with Wolf, and will continue to train as his backup "in the unlikely event that she is needed," NASA said. Wolf, a physician, was to have been launched to Mir in January as the station's final U.S. crewmember. Pending further review, NASA still plans to exchange Wolf in January with another astronaut, possibly Andrew Thomas. [Aerospace Daily, July 31, 1997, p 6. Aviation Week & Space Technology, August 4, 1997, p 17.]

BRUCE WILLIS TO FILM AT KSC

Bruce Willis is headed to Kennedy Space Center for filming his latest movie, *Armageddon*, sometime before the end of the year. In *Armageddon*, Willis plays an oil driller blasted into space aboard a shuttle to blow up an asteroid before it smashes into Earth and destroys humanity. The film's executive producer, Jim Van Wyck, wowed NASA staffers Wednesday with a trailer for the film, featuring footage of

recent shuttle launches. He says they're trying to sign *Sling Blade's* Billy Bob Thornton to play a retired NASA exec who comes back to help save the world. [The Orlando Sentinel, July 31, 1997, p A-2.]

CANADARM DESTINED FOR KENNEDY SPACE CENTER

Spar technicians shipped Canadarm 303 to NASA's Kennedy Space Center July 30 from Spar's robotics facility. Arm 303, recently upgraded to handle heavier payloads to support International Space Station assembly flights, was critical to the retrieval and repair of Hubble Space Telescope in December 1993. Once received at NASA, Canadarm will be installed on the Space Shuttle Columbia for its next mission, STS-87 planned for November 19, 1997 where, among other experiments, it will be used to deploy the Spartan 201, a Solar Physics Spacecraft designed to investigate the behavior of the Sun's outer atmosphere (the corona) and the solar winds emanating from it. [The Brevard Technical Journal, August 1997, p 16.]

July 31:

ADVANCED COMPOSITION EXPLORER UPDATE

Stacking of the Delta II launch vehicle began earlier this week at Launch Complex 17, as operations continue for the scheduled launch of the Advanced Composition Explorer (ACE) spacecraft atop the rocket on Aug. 25. Stacking of the Delta first stage was completed Tuesday (July 29), with the erection of the nine strap-on SRBs slated for completion on Friday (August 1). Current plans are for the rocket's second stage to be hoisted into the gantry and mated to the first stage on Saturday, Aug. 2. The scientific goal of the 1,730 pound ACE observatory is to accurately measure the composition of several different types of matter that come near the Earth from the Sun, from between the planets and from the Milky Way galaxy beyond our solar system. Many of the ACE instruments are at least 100 times more sensitive than any previously flown. [KSC Countdown, July 31, 1997.]

MIR PREREQUISITE: SPACEWALKING

Only trained NASA spacewalkers capable of doing tricky repair work in a pinch are likely to be considered for future U.S. missions aboard Russia's battered space station Mir, officials said Thursday. That means astronaut Wendy Lawrence, who was bumped this week from NASA's next Mir research mission, also stands to be shut out of the agency's seventh and final tour of duty on the out-post in early 1998. Lawrence, the 5-foot-3-inch Navy commander, was abruptly replaced Wednesday by astronaut David Wolf because she had never trained for space-walking work and is too short to wear bulky Russian spacesuits. The next Mir crew, which will arrive at the crippled station Thursday, faces a series of six spacewalks, half of which will be devoted to repairing the lab ruptured in a June 25 cargo ship crash and restoring power lost in the collision. Wolf, 40, a medical doctor, has tallied 150 hours of spacewalk training in the United States. The veteran astronaut also will be put through an

accelerated training program in Russia during the next month. The switch marked the second time Lawrence has been removed from a Mir flight. In 1995, she was yanked from training after she was deemed too short to fit into seats aboard the Soyuz spacecraft parked at the station for emergency returns to Earth. [Florida Today, August 1, 1997, p 1A & 2A.]

During July:

NASA'S WORKHORSE REACHES OLD AGE

The key to successful use and exploitation of the low earth orbit area lies in keeping the Space Shuttle system -- both the orbiting craft and the ground infrastructure which supports them -- operational through the year 2012 and possibly a good deal longer. And that is proving to be a job requiring a lot of planning and effort. The shuttle orbiter were designed for an operational lifetime of 100 flights each. As of July 1, 1997, the high-time shuttles -- Discovery and Columbia -- each have flown 22 missions. Atlantis has flown 19, Endeavour 11 and Challenger 10, for a total of 84 orbital missions. With only six to seven flights now scheduled each year, it would appear that there is a lot of life left in the shuttle. But appearances can be deceiving. First, the number of missions planned per year is going to increase dramatically as the International Space Station (ISS) development, construction and use grow. The first ISS components now are scheduled to be launched in June, 1998, less than a year away. Seven of the first 10 space flights in support of the ISS are to be made by the shuttle orbiters. The number of flights by the shuttle orbiters, which totaled as few as four or five per year as late as 1984, now is approaching seven flights per year. The number of flights is expected to climb to eight to 10 per year by 2002 and on up to 15 per year by 2012. Since costs and the rate of launches of the shuttle orbiters are linked, this will have a beneficial effect in reducing the cost of each flight. But it will also begin to eat up the shuttle's design lives quickly. More importantly, much of the equipment in the shuttle system -- both the orbiters and the ground infrastructure which supports the flying portion -- is growing obsolescent, if not obsolete. Finally, the Space Shuttle system is going to have new requirements imposed on it which will require major changes as the new century gets underway. To prepare for this future, which is expected to be both demanding and fast-paced, NASA has created the Office of Space Shuttle Development, which is aimed at focusing attention on the future needs of the space transportation system. William F. Readdy, manager of the new office, said that major hardware upgrades will be needed on both the orbiters and the support infrastructure, in order to ensure a man-rated space transportation system which is safe, reliable and affordable. "The space shuttle system is the foundation of human space flight right now," he said. "It is what allows us to build and utilize the ISS and if we don't maintain a safe, reliable and affordable space shuttle system, then we won't be able to do any of these other things. We are going to invest in the future of the space shuttle. We expect to leverage the technology developed by the X-series of research vehicles." [Launchspace Magazine, August/September 1997, p 28-31.]

X-38 MAKES FIRST CAPTIVE FLIGHT

NASA's first X-38 advanced technology demonstrator for the planned crew return vehicle (CRV) has made its first captive carry flight on the space agency's B-52 carrier aircraft. The test vehicle is designed to validate technologies required for future emergency crew return capability from the International Space Station. Captive carry research flight from Edwards AFB, Calif., are scheduled to be followed by unpiloted free-flights of the X-38 from the B-52 beginning this fall. The X-38 is modeled after the 1969-vintage Martin Marietta X-24A lifting body and built from fiberglass.

[Aviation Week & Space Technology, August 4, 1997, p 16.]

AUGUST

August 1:

AKERS TO RETURN TO U.S. AIR FORCE

Astronaut Tom Akers (Col., USAF) a four-time shuttle veteran and currently Assistant Director (Technical) for the Johnson Space Center, has returned to the Air Force after a 10-year career with NASA. Selected as an astronaut in 1987, Akers has accumulated more than 800 hours of space flight, including 29 hours performing extravehicular activities, or spacewalks. [NASA News Release #97-167, August 1, 1997.]

ROCKET PLANT DECISION ON HOLD

Brevard County and three other communities vying to be the home of McDonnell Douglas' proposed Delta 4 rocket plant are entering another month of suspense. And the waiting may not be over soon. When the four areas were selected in May as finalists for the plant site, McDonnell Douglas officials said a decision would be made by the end of July. But the aerospace company, which officially becomes part of The Boeing Co. on Monday, still is poring over information about the four locations, trying to determine which one will provide the most cost-effective rocket. Company officials say they are not committing themselves to a specific timeline for an announcement. [Florida Today, August 1, 1997, p 1A.]

LOST IN SPACE FOR 30 YEARS

If you've been to Kennedy Space Center Visitor Complex recently, you've probably marveled at the sights of John Glenn's spacesuit, the take-you-breath-away IMAX movies and the view of the space shuttle on the pad. That's a far cry from more than 30 years ago when the then-Cape Kennedy was only open to visitors for three hours on Sunday and the tour consisted of driving around the Cape with a self-guided tour book. Today, the Visitor Complex has grown into the Space Coast's premiere attraction, with over 2.4 million visitors annually. To mark the complex's 30th anniversary, the public is invited to two free concerts featuring country star Clay Walker and Diamond Rio. The Visitor Complex began its history in 1964 when NASA announced plans for the information center to be built on a 70-acre site on spaceport property. The \$1.2 million center began to take shape in 1965 with hopes that three million tourists would visit each year. The first official bus tour got under way on July 22, 1966, before construction on the center was complete. On Aug. 1, 1967, the visitor information center opened its door to the public, 14 months before the first Apollo launch. Within a year, attendance reached 834,000. Since it opened 30 years ago, 50 million visitors have toured the site. [Florida Today, TGIF, July 25, 1997, p 16. Florida Today, August 1, 1997, p 4B.]

August 2:

PATHFINDER AMBLES; PUBLIC AWED

Scientists estimated the Pathfinder lander and rover would remain operable for about 30 days on Mars, but no one really knows when the machines will stop working. Scientists say eventually the extreme fluctuations of temperatures should cause mechanical breakdowns. Temperatures range from highs of 80 degrees Fahrenheit to lows of -199 degrees. Next up in NASA's interplanetary invasion force: the Mars Global Surveyor spacecraft, which is scheduled to dip into orbit around the Red Planet at 9:39 p.m. Sept. 11. Carrying replacements for six of eight instruments lost with NASA's Mars Observer in 1993, the \$155 million global Surveyor is to map 99 percent of the planet's surface over two-years. Circling 235 miles above Mars, the probe then will be converted into an orbital relay station, beaming back data from a brigade of landers and rovers NASA plans to send to the Red Planet over the next 10 years. [Florida Today, August 2, 1997, p 2A.]

ANATOMY OF A SPACESUIT

Like a giant 250-pound jigsaw puzzle, the U.S. spacesuit is assembled from components tailor-made for it by workers who do not see the final product except in images broadcast from space. Eighty firms contribute to the \$10.4 million suit, officially called an extravehicular mobility unit, making parts as tiny as a one-eighth-inch washer and as big as a 30-inch-long water tank. The extravehicular mobility unit is used only when astronauts leave the shuttle for space walks and is not to be confused with the flight suit, the orange jumper that astronauts wear in the shuttle during missions. Even the company that oversees the subcontractors and assembly of the suit, Hamilton Standard, does not see the pieces come together -- that happens at NASA headquarters in Houston. NASA now has 17 complete spacesuits. Minus life-support systems, about 50 suits have been made. The white suit weighs 250 pounds on earth and takes 15 minutes to don. It is equipped with a drink bag in the helmet, a visor in case the sun is too bright and a camera to record the extravehicular activity. Because space work and walks can last seven hours, the suit is also equipped with a urine collection device to allow for a bathroom break. All parts are American made. [Florida Today, August 3, 1997, p 5E & 6E.]

KSC VISITOR COMPLEX THROWS A PARTY

Some 15,000 people visited the Kennedy Space Center Visitor Complex on Saturday as the center celebrated its 30th anniversary. As part of its community appreciation celebration, the center sponsored a free concert Saturday by the nationally known country and western band Diamond Rio. Music fans relaxed in front of the Rocket Garden as Diamond Rio performed. Dan LeBlanc, director of marketing for the Visitor Complex, said they were pleased with the turnout. Most of the concertgoers began arriving about the time most tourists were leaving, so there was no need to go into overflow parking, he said. [Florida Today, August 3, 1997, p 1A.]

August 4:

NASA SELECTS ISO 9001 REGISTRAR

NASA has selected a third-party registrar, Det Norske Veritas Certification, Inc. (DNV Inc.) located in Houston, TX, to provide detailed compliance audits of NASA's Ames Research Center, Dryden Flight Research Center, Goddard Space Flight Center, Jet Propulsion Laboratory, Kennedy Space Center, Langley Research Center, Lewis Research Center, Stennis Space Center and NASA Headquarters. This selection is a key milestone in moving towards NASA Administrator Daniel S. Goldin's challenge to have the Agency ISO 9001-certified by September 1999. ISO 9001, "Quality Systems - Model for Quality Assurance in Design, Development, Production, Installation, and Servicing," is an international standard for quality management systems that has been accepted by over 100 countries around the world. NASA is the first federal agency to commit to ISO 9001 certification. Once certified, NASA will demonstrate its commitment to excellence in aeronautics and spaceflight technology, as well as in internationally accepted quality management practices. [NASA News Release #97-168, August 4, 1997.]

NEW BOEING MARKS FIRST DAY OF OPERATION

Boeing Co., having completed its acquisition of McDonnell Douglas Corp. on Friday, today marked its first day of operation as a single, \$16 billion company of 220,000 employees. [Aerospace Daily, August 5, 1997, p 2.]

INAUGURAL "QUALITY DOLLAR AWARD" PRESENTED TO EG&G/NASA TEAM

KSC Director Roy Bridges unveiled and presented his first Quality Dollar Award -- a gold coin and framed certificate -- to the EG&G/NASA Maintenance Management Team. The "gold dollar" award is presented to individuals or teams that make significant contributions to continual process improvement, demonstrate model behavior or use innovative approaches to ensure customer satisfaction. At the presentation, Mr. Bridges said "I hope you will be a model for others to follow both in teamwork and in the thought you have put into the project." The 18 member EG&G/NASA Maintenance Management Team worked toward sustaining the availability and reliability of facilities and utilities in a cost effective manner through the use of Reliability Centered Maintenance. The team employed a new process to transition from a reactive maintenance culture to one that promotes proactive maintenance based upon facility condition tending. Since the program began, the team estimates a \$250,000 cost savings and \$1 million cost avoidance. Mr. Bridges also announced a silver dollar award that directors will have the authority to present. [KSC Countdown, August 5, 1997.]

STS-85 LAUNCH COUNTDOWN BEGINS

The countdown for launch of Space Shuttle Discovery on the Cryogenic Infrared Spectrometers and Telescopes for the Atmosphere (CRISTA-SPAS) mission began yesterday at 3 p.m. at the T-43 hour mark. The KSC launch team will conduct the countdown from Firing Room 3 of the Launch Control Center. The countdown includes 24 hours and 41 minutes of built-in hold time leading to the opening of the launch window at 10:41 a.m. on Thursday, Aug. 7. At press time there was a 60% chance of favorable weather conditions at the opening of the 1 hour, 39 minute launch window. The STS-85 crew are: Commander Curtis Brown, Pilot Kent Rominger, Mission Specialists Jan Davis, Robert Curbeam and Stephen Robinson, and Payload Specialist Bjarni Tryggvason of the Canadian Space Agency. [KSC Countdown, August 5, 1997.]

Wallops Launching Balloons and Rockets to Support Space Shuttle Payload

A flurry of launch activity will occur on the Eastern Shore of Virginia over the next two weeks as personnel from the NASA Goddard Space Flight center's Wallops Flight Facility, Wallops Island, VA, launch a total of 67 balloons and rockets taking atmospheric measurements in support of the STS-85 Space Shuttle Mission. Beginning August 4 and concluding August 22, Wallops' personnel will launch 33 each meteorological balloons and rockets and one solid rocket in support of the primary payload on mission STS-85, the Cryogenic Infrared Spectrometers and Telescopes for the Atmosphere-Shuttle Pallet Satellite-2 (CRISTA-SPAS-2). Space Shuttle Discovery and a 6-person crew are scheduled to begin a 10-day mission with a planned launch from the Kennedy Space Center, FL, on August 7 at 10:41 a.m. EDT. [NASA News Release #97-12, August 6, 1997.]

August 5:

Parker Named New Director of JPL Management Office

Dr. Robert Parker has been selected as the new director of the NASA Management Office at the Jet propulsion Laboratory (JPL), Pasadena, CA, NASA's Associate Administrator for Space Science, Dr. Wesley T. Huntress Jr., announced today. Currently director of Space Operations and Utilization in the Office of Space Flight at NASA Headquarters, Parker, 60, is a former astronaut who flew aboard Space Shuttle mission STS-35 in December 1990 and STS-9 in November 1983. [NASA News Release #97-169, August 5, 1997.]

MIR 23/NASA 5 STATUS REPORT

Two Russian cosmonauts comprising the Mir 24 crew headed for a six-month stay on the Russian space station Mir today, blasting off on time from the Baikonur

cosmodrome in Kazakstan in their Soyuz TM-26 capsule. Veteran Commander Anatoly Solovyev and Flight Engineer Pavel Vinogradov were launched at 11:36 a.m. EDT, twilight at the Central Asian desert spaceport. [NASA Phase 1 Status, August 5, 1997.]

August 7:

SHUTTLE CREW WASTES NO TIME GETTING EXPERIMENTS STARTED

Space shuttle Discovery blasted off from Kennedy Space Center at 10:41 a.m. Launch went smoothly with only weather worrying launch officials. It was a record 10th straight time NASA has launched a shuttle on the first try, a streak going back to May 1996. The STS-85 crew released the German CRISTA-SPAS free-flyer satellite deployed from the shuttle's cargo bay at 6:27 p.m. EDT. Deploy of the satellite was delayed by approximately 30 minutes due to a problem in the command link buffer for uploading commands to switch on the spacecraft. Mission controllers solved the buffer problem and deployed the spacecraft 7 hours and 46 minutes after the shuttle's launch from Kennedy Space Center. CRISTA-SPAS has been activated and both primary instruments on the spacecraft have begun taking science. CRISTA will study how chemicals react in the atmosphere to affect the ozone layer, which protects Earth from harmful ultra-violet rays. The satellite will be recaptured August 16. The flight is scheduled to last for 11 days. [The Orlando Sentinel, August 8, 1997, p A-1 & A-12. NASA SPAS Status Report No. 1, August 8, 1997.]

ICELAND RALLIES AROUND NATIVE SON

Shuttle Discovery payload specialist Bjarni Tryggvason was only a tot when he and his family left their native Iceland for Canada. Though Tryggvason, 51, has long since become a Canadian citizen and astronaut, that has hardly dampened the pride of the remote Scandanavian nation's 270,000 residents. "We don't claim him as our own -- we share him with Canada -- but the icelandic settlement in Canada has always been very strong," said Iceland's president, Olafur Ragnar Grimsson, who made the trip to Kennedy Space Center on Thursday morning to see Tryggvason off. "It's very big. It's the story in Iceland," Grimsson said. "We are a nation of discoverers and settlers, and we see it as a continuation of the great Viking tradition." The first current or former Iclander in space, Tryggvason's journey comes almost 1,000 years after Leif Ericson's journey to the North American continent. The nation of Iceland was created by Vikings who sailed in search of new land. [Florida Today, August 8, 1997, p 10A.]

TINY LEAKS MAY DELAY SPACE PROBE

Several tiny leaks have sprung up in the rocket that is supposed to launch NASA's controversial plutonium-carrying Cassini space probe in October. The discovery could delay the Cape Canaveral launch until 1999. In a test Thursday, the U.S. Air Force

discovered several leaks when the rocket's upper-stage booster was loaded with fuel. Engineers will spend the next several days trying to find and seal the leaks, Air Force spokesman Lt. Col. John Martin said Thursday. He said the rocket still may be ready for its Oct. 6 launch date. NASA would like to launch the Titan rocket carrying Cassini by Nov. 5. But the \$1.2 billion-dollar probe, which will head to Saturn, could be launched on a longer and slower route to Saturn between Dec. 1 and next Jan. 4. The next opportunity to launch toward Saturn isn't until March 1999, said NASA spokeswoman Mary Beth Murrill. [The Orlando Sentinel, August 8, 1997, p A-12.]

August 8:

MIR REPAIR CREW LOOKS THINGS OVER

Two newly arrived cosmonauts checked out the banged-up Mir on Friday, knowing that the future of the Russian space station depends on the success of their risky repair mission. Russia's troubled space program, meanwhile, got a boost when President Boris Yeltsin ordered the government to borrow nearly \$100 million from foreign banks for the national space agency. Mir's replacement crew, whose Soyuz TM-26 capsule docked Thursday (Aug. 7) night, will try to salvage the breakdown-prone 11-year-old station, running on half power and with one of its six modules sealed off. The outgoing Russian crew -- Vasily Tsibliyev and Alexander Lazutkin -- showed new arrivals Anatoly Solovyov and Pavel Vinogradov around the space station Friday in preparation for handing over control. The crews will overlap a week. Also on board is U.S. astronaut Michael Foale, who is scheduled to return home in the fall. Thursday's docking, though successful, did not go according to plan. Solovyov, a veteran of four Mir missions, was forced to override the automated docking procedure and bring the Soyuz in manually for the final 42 feet. [Florida Today, August 9, 1997, p 7A.]

MARS MISSION '100 PERCENT SUCCESS,' NASA SAYS

Wrapping up Pathfinder's primary 30-day mission, National Aeronautics and Space Administration scientists Friday declared the space agency's return to the Red Planet after 20 years a "100 percent success." Pathfinder's success "proves that future rovers don't have to be pickup trucks to do good science," Mars program manager Donna Shirley said after a news briefing at Pasadena's Jet Propulsion Laboratory. During the past 30 days, Pathfinder has taken nearly 10,000 images of the Red Planet, covered more than 50 yards of territory -- including a complete circumnavigation of the lander -- and sent back millions of weather readings. With more than 566 million hits on the World Wide Web, the mission also became "the largest internet event in the history of the world," project scientist Matthew Golombek said. [Florida Today, August 9, 1997, p 7A.]

ROBOT ARM HAS BUMPY FIRST TEST

The five-foot-long Japanese robot arm similar to one destined for the proposed

International Space Station got off to a rocky debut Friday when astronauts Steve Robinson and Jan Davis put it through initial tests. "As with any first-time flier on the shuttle, it's a learning experience every step of the way," mission flight commentator Ed Campion said. At different times Friday, systems on the arm that were supposed to work together would get into a conflict, causing the arm to move improperly. NASA officials were forced to delay until later in the mission its primary tests: Loosening and tightening a pair of bolts and opening and closing a door. [Florida Today, August 9, 1997, p 7A.]

SPACE PROBE BACK ON TRACK

The launch of NASA's plutonium-carrying Cassini space probe is back on schedule. Air Force engineers isolated two small leaks in an upper stage booster of the rocket that will carry Cassini. The leaks should be fixed quickly and easily, Lt. Col. John Martin said Friday. The leaks turned out to be routine trouble with a poorly fitting seal. The Titan rocket is scheduled to launch the \$1.2 billion Cassini toward Saturn on Oct. 6. [The Orlando Sentinel, August 9, 1997, p A-21.]

August 10:

ARE COMETS BOMBARDING THE EARTH?

Early results from the ozone-watching satellite released by space shuttle Discovery appear to support a theory that Earth is being bombarded daily by thousands of house-size comets, a scientist said Sunday. The free-flying, German-built satellite released Thursday has detected much more water vapor in the upper atmosphere at northern latitudes than current theories predicted, Robert Conway of the Naval Research Laboratory said. One possible explanation is that the Earth is being pelted by snow-ball-like mini-comets that release large clouds of water vapor into the atmosphere. Louis Frank, a space physicist at the University of Iowa, was ridiculed by the scientific community when he first proposed the controversial comet theory in a scientific journal in 1986. Frank's theory was backed up this May by new data from a NASA satellite, which appears to show the Earth is being bombarded by between five and 30 small comets every minute. [Orlando Sentinel, August 11, 1997, p A-5.]

August 12:

AMERICAN EXPRESS AWARDED TRAVEL SERVICES CONTRACT

American Express Government Services has been awarded NASA's Travel Services Contract and will assume their new responsibilities effective Aug. 30. [KSC Countdown, August 12, 1997.]

STS-85 KSC CRISTA-SPAS STATUS REPORT

The ASTRO-SPAS carrier continues to perform well and today passed the 1,000-hour mark of cumulative time logged in space for all the missions it has flown. The

CRISTA and MAHRSI instruments continue to record high quality data of the Earth's atmosphere. [NASA SPAS Status Report No. 4, August 12, 1997.]

SATELLITE SIDESTEPS COLLISION WITH JUNK

A satellite dropped into orbit by shuttle Discovery dodged a 500-pound piece of space junk that came close to the craft and could have destroyed it, NASA officials said Tuesday. The near miss involved an ozone-monitoring satellite and an old rocket motor, which passed within 1 ½ miles of each other. The German built satellite was trailing Discovery by 51 miles at the time of the Monday night incident, and the rocket motor came no closer to the shuttle than 50 miles, officials said. The old motor was used in the unsuccessful launch of a communication satellite that was carried up on the shuttle Challenger in 1984. Discovery's astronauts plan to retrieve the satellite Saturday and bring it home when the shuttle lands Monday. [Florida Today, August 13, 1997, p 2A.]

August 13:

DESPITE HIGHER FEES, VISITORS FLOCK TO U.S. NATIONAL PARKS

At Canaveral National Seashore, the number of visitors through the first six months of the year was down 4.3 percent from last year. Last year, 784,623 people had visited the seashore through June 30, compared with 751,096 so far this year. The seashore started collecting an entrance fee April 26. [Florida Today, August 14, 1997, p 5A.]

AFTER ROUGH DUTY, COSMONAUTS CAN ENJOY BIG PAY DAY

The Russian space program has an elaborate bonus system than includes not only general hazardous-duty pay, but specific payments for such tasks as spacewalks and manual dockings. By switching from the automated docking system to manual, cosmonaut Anatoly Solovyov should pocket an extra \$1,000 when he returns to Earth in 6 ½ months, according to the Russian daily *Kommersant*, one of several Russian news outlets that have reported specific amounts. The average pay for cosmonauts is about \$3,000 per month in orbit. The new Russian crew, Solovyov and Pavel Vinogradov, could earn as much again in bonuses and finish their mission with a \$40,000 paycheck, media reports say. The bonus money is in performing up to six spacewalks and vital repair work on Mir's damaged Spektr module. NASA astronauts, who are considered U.S. government employees, earn between \$48,000 and \$103,000 a year, depending on their years with the government and past promotions. Astronauts on Mir receive only their regular 40-hour-a-week pay -- no overtime, comp time or bonuses, according to NASA spokeswoman Eileen Hawley. [Florida Today, August 14, 1997, p 6A.]

ROBOTIC ARM CONTINUES TO HAVE PROBLEMS

Taking over from astronauts, ground controllers Wednesday put a small robotic arm aboard shuttle Discovery through a series of movements even though problems again plagued the \$100 million instrument. The problem is thought to reside not in the arm itself, but in a system of laptop computers aboard Discovery that links the arm with the ground commands. Similar hang-ups happened during earlier tests. Scientists are flying the arm in hopes of working out glitches before a similar model goes to work aboard the \$40 billion international space station. [Florida Today, August 14, 1997, p 6A.]

August 14:

FORMER NASA OFFICIAL RECEIVES GUGGENHEIM MEDAL

Abe Silverstein, a leading figure in 20th century aerospace engineering and a former NASA center director, was presented today the prestigious Guggenheim Medal by representatives from the Guggenheim Medal Fund and the American Institute of Aeronautics and Astronautics. Silverstein's citation praises his "technical contributions and visionary leadership in advancing technology of aircraft and propulsion performance, and foresight in establishing the Mercury and Gemini manned space flight activities." He was Director of NASA's Lewis Research Center from 1961-1969. [NASA News Release #97-177, August 14, 1997.]

RUSSIANS BACK FROM DIFFICULT MIR STINT

Two Russian cosmonauts who spent six months on the Mir space station landed safely in the steppes of Kazakstan on Thursday after one of the toughest missions in the history of manned space flight. The blackened Soyuz capsule, dangling beneath a huge white and yellow brake parachute, floated smoothly down to the barren Kazak steppe land about 4:20 p.m. Moscow time (8:20 a.m. EDT), slightly behind schedule. [The Orlando Sentinel, August 15, 1997, p A-16.]

DISCOVERY CREW GETS READY TO RETRIEVE GERMAN SATELLITE

Shuttle Discovery's astronauts will begin chasing down a German science satellite today while ground engineers investigate minor damage to the rocket boosters that helped propel the ship into space. Speeding along about 17,500 mph, Discovery commander Curt Brown will fire onboard thrusters and begin closing a 40-mile gap between the shuttle and the 7,700-pound atmospheric research satellite. The 180-mile-high maneuvers will set the stage for the planned Saturday retrieval of the satellite, which has been flying in formation with Discovery since the crew deployed it seven hours after an Aug. 7 launch. Back on Earth, engineers reported that hot gasses carved seven to 10 shallow trenches in insulation lining the inside of the bell-shaped

nozzle of one of the two solid rocket boosters that helped propel Discovery into orbit. NASA officials said the damage didn't endanger Discovery's crew and isn't expected to delay the planned late September launch of Atlantis to Russia's space station Mir. The damage "is so slight in that it's hardly noticeable," said June Malone, a spokeswoman for NASA's Marshall Space Flight Center in Huntsville, Ala. [Florida Today, August 15, 1997, p 2A.]

August 16: SPACEWALK A GAMBLE NASA'S BETTING ON

Two months after the worst orbital collision ever, the most monumental repair job in the history of space exploration is about to begin. And for Russia's once-vaunted manned space program, the stakes are high. The future of Mir, the world's only space station and a crucial money-maker for the cash-strapped former Soviet Union, is on the line. Veteran Mir commander Anatoly Solovyov and first-time flyer Pavel Vinogradov must restore enough electricity to make foreign research trips worth the investment. And they're also being asked to tackle an unprecedented job: finding and sealing holes in the Spektr science module, which houses 50 percent of U.S. experiments on Mir, so the battered lab can be reopened for business. The repair effort is to begin at 5:25 a.m. EDT Wednesday (August 20) as Solovyov, who is the world's most experienced spacewalker, and Vinogradov don spacesuits and open the sealed hatch to the now airless and darkened spektr module. Solovyov, 49, will act as an orbital electrician on his 10th spacewalk. Vinogradov, 43, will shine the flashlight over his partner's shoulder. The idea is to hook up power cables that had to be disconnected after the crash so the lab's hatch could be sealed before all breathing air on Mir was lost. The cables are to be routed to a new hatch equipped with electrical connectors. Extension cords then will be put in place so power can be relayed to the rest of Mir. U.S. astronaut Michael Foale will be inside a Soyuz spacecraft that would be used to abandon ship and return to Earth if something went badly wrong. The job is expected to take four hours to complete. [Florida Today, August 17, 1997, p 8A.]

August 17: SHUTTLE CREW PACKS FOR RETURN HOME

With their experiments nearly completed and an environmental satellite safely back in the cargo bay, the crew of space shuttle Discovery will spend today preparing the orbiter for its Monday morning return home. NASA spokesman James Hartsfield said weather conditions are favorable for Monday's landing at Kennedy Space Center, scheduled for 7:14 a.m. [Florida Today, August 17, 1997, p 1A.]

PATHFINDER STOPS COMMUNICATING

Communication between Earth and Mars Pathfinder was cut off after only three minutes of data downloading with no immediately know cause. NASA, which lost communication with the Pathfinder late Saturday (Aug. 16), hoped to learn what caused the disconnection during a four-hour download session scheduled for late

Sunday, said flight director Rob Manning at the Jet Propulsion Laboratory. The crew communicates with Pathfinder and the rover through the Deep Space Network antennas on Earth. [Florida Today, August 18, 1997, p 3A.]

COMPUTER ERROR DELAYS MIR DOCKING

A new misfortune befell the battered Mir space station Sunday when officials put off its planned docking with the Progress supply ship for a day, citing a malfunction in an on-board computer. NASA quoted Russian flight controllers as saying the computer on Progress shut itself down as a safety precaution when it received conflicting commands from the ground. Officials at the Mission Control Center outside Moscow said the latest trouble posed no danger to those aboard Mir, two cosmonauts and American astronaut Michael Foale. [The Orlando Sentinel, August 18, 1997, p A-4.]

August 18:

FAULTY FORECAST EXTENDS MISSION

The space shuttle Discovery's landing plans were lost in the non-existent fog Monday. So NASA will try again today at 7:08 a.m. The weather at Kennedy Space Center looked good Monday morning. Astronaut Ken Cockrell flew a plane over the landing strip several times and found virtually no clouds or fog. He told mission control it was clear enough for a shuttle to land. But at Johnson Space Center in Houston, more than 1,000 miles away from KSC, meteorologists forecasted that ground fog would develop. About 75 minutes before the shuttle was supposed to land, mission control told Discovery Commander Curt Brown to stay up in space another day. Officials at KSC, which has its own weather forecasters, went outside at the scheduled 7:14 a.m. landing time and looked for fog. They couldn't find any. It was crystal clear. "There was a chance that ground fog was going to build," Johnson spokeswoman Eileen Hawley said. She said meteorologists had to make a call more than an hour in advance. It was the first time this year that a shuttle didn't land on the day it was scheduled. [The Orlando Sentinel, August 19, 1997, p A-9.]

IT HAPPENED: THINGS GOT WORSE ON MIR

Just when it seemed impossible for conditions to get any worse on Mir, the Russian space station's main computer failed Monday, leaving the crippled outpost tumbling for three hours with many of its systems shut down to save power. The problem will delay a crucial internal spacewalk to restore most of the power lost during a June 25 crash with a robot supply ship. The spacewalk into the dead Spektr module was scheduled for Wednesday but will happen no earlier than Friday, NASA spokesman Rob Navias said. It will take at least a day or two to restore power to the minimal level that Mir was operating on before the computer failed, NASA officials said. The station was stabilized later in the day and is orientated to the sun. The three-man crew is safe, NASA and Russian officials said. [The Orlando Sentinel, August 19, 1997, p A-1 & A-9.]

ATLANTIS ROLLS OUT TO PAD 39A

The Space Shuttle Atlantis rolled out to launch pad 39A at about 2 a.m. today and was hard down at 8:30 a.m. The Rotating Service Structure was rolled around Atlantis at about 11 a.m. Main engine flight readiness testing begins tomorrow. The Spacehab payload is slated to join the orbiter at the pad Aug. 28. [Bruce Buckingham. (1997). **Kennedy Space Center Space Shuttle Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe/shuttle-status [1997, August 18].]

August 19:

DISCOVERY RETURNS HOME AT DAWN

The shuttle orbiter Discovery lands at dawn at the Kennedy Space Center Aug. 19 after a forecast of fog kept the shuttle Mission 85 crew aloft for an extra day. Mission commander USAF Lt. Col. Curt Brown, Jr., and copilot Navy Cdr. Kent Rominger piloted Discovery on a reentry ground track from a 138-naut.-mi., 57-deg. orbit northward up the South Pacific across Mexico's Yucatan Peninsula to a landing on Kennedy's Runway 33. During the last half of the 12-day mission, the flight obtained an extra day of ground command tests with a new Japanese robotic arm. During retrieval of the flight's German Crista-Spas satellite, the crew piloted the orbiter on rendezvous simulating an approach to the new International Space Station. The Mission 85 crew also used the Spas on the arm to simulate procedures that will be used to grapple and maneuver the Russian FGB spacecraft during the first shuttle/station assembly flight planned for launch in mid 1998. [**Aviation Week & Space Technology**, August 25, 1997, p 16.]

ADVANCED COMPOSITION EXPLORER TO BE LAUNCHED AUG. 24

The launch of NASA's Advanced Composition Explorer (ACE) aboard a Boeing Delta II rocket is scheduled for Aug. 24. Liftoff is targeted to occur at the opening of a launch window which extends from 10:41 - 11:06 a.m. EDT, a duration of 25 minutes. Launch will occur from Pad A at Complex 17 on Cape Canaveral Air Station. ACE, built for NASA by the Johns Hopkins University Applied Physics Laboratory, is a spin-stabilized spacecraft having a combination of nine sensors and instruments. The spacecraft will orbit the Libration Point, a location 900,000 miles from Earth where the gravitational effects of the Sun and Earth are balanced. ACE will give scientists information about the formation of solar corona, solar flares, the acceleration of the solar wind and the Sun's effect on the near-Earth environment. [**NASA News Release #143-97**, August 19, 1997.]

NASA/INDUSTRY TEAM SCORES BIG WITH DUAL-USE TECHNOLOGY

A partnership between Kennedy Space Center, the State of Florida and manufacturer

L-3 Communications Telemetry & Instrumentation will deliver a new system that enhances Shuttle launch preparations and promises commercial applications as well. On Aug. 22 at the KSC Visitor Complex, L-3 Communications will present the finished product to KSC Director Roy Bridges and other managers. The new Automated Data Acquisition System (ADAS) will save up to 20,000 man-hours per year while monitoring temperature, pressure and vibration measurements at KSC's Shuttle launch pads. Before ADAS, when test engineers needed to reset Shuttle sensors they also had to manually re-adjust hundreds of transducers. The new system reduces that effort from hours to seconds. "Sharing NASA expertise while improving Shuttle safety is directly inline with KSC's goal to build productive partnerships with industry," said Dr. Gale Allen, chief of KSC's Technology Programs and Commercialization Office. Jointly funded by NASA and the State of Florida's Technological Research Development Authority (TRDA), a development team comprised of NASA, I-NET and L-3 engineers pooled their expertise to achieve this technology breakthrough -- the Universal Signal Conditioning Amplifier (USCA). USCA has a continuous calibration feature which allows it to recognize and automatically match itself to any type of transducer. [NASA News Release #144-97, August 19, 1997.]

August 20:

CASSINI LAUNCH REMAINS ON SCHEDULE

The Terminal Countdown Demonstration of the Air Force Titan IV rocket for NASA's Cassini mission has been successfully completed. Today's Terminal Countdown Demonstration was a retest after leaks were repaired on the Centaur upper stage identified during the initial demonstration on Aug. 5. "The success of the Titan test today keeps the launch of Cassini on target for Oct. 6," said Richard Spehalski, Cassini Program Manager. "The processing of the spacecraft here at KSC has gone well and we are also on schedule." The Cassini spacecraft is scheduled for liftoff from Cape Canaveral Air Station, Space Launch Complex 40, on Oct. 6 at 5:38 a.m. EDT. This will begin Cassini's 6.7 year journey to explore the planet Saturn. [NASA News Release #145-20, August 20, 1997.]

EG&G CHOSEN TO PROVIDE CENTER OPERATIONS SUPPORT SERVICES TO NASA'S MARSHALL CENTER

EG&G Alabama, Inc., a division of EG&G, Inc., of Cocoa, FL, has been awarded a contract by NASA's Marshall Space Flight Center, Huntsville, AL, to provide center operations support services for a period of up to five years, beginning Sept. 1, 1997. Services to be provided under the contract include operations, maintenance, renovations, modifications, construction, and environmental support services at the center. [NASA Contract Announcement #C-97-j, August 20, 1997.]

ALL SYSTEMS ON GO FOR MIR SPACEWALK

U. S. and Russian officials declared victory Wednesday in the latest crisis on the space station Mir and gave two spacewalking cosmonauts the go-ahead for a critical repair job Friday. U.S. astronaut Michael Foale also was cleared to prepare for spacewalking inspection work that will take place next month outside a Mir laboratory that was punctured in a June 25 cargo ship crash. NASA officials said a final decision on whether Foale actually will be pressed into service for the planned Sept. 3 spacewalk won't be made before Labor Day. [Florida Today, August 21, 1997, p 1A.]

COSMONAUT TOUTS MILK IN COMMERCIAL FOR ISRAELI VIEWERS

One small drop of milk; one giant leap for TV commercials. When he wasn't scrambling to fix his accident-prone space station, Mir cosmonaut Vasily Tsibliyev was busy making a television commercial for an Israeli brand of long-life milk. The commercial -- broadcast Wednesday on Israel's Channel Two television-- shows Tsibliyev swallowing a floating blob of Tnuva milk. Powered milk has flown in space since the Apollo missions but the real thing apparently has never made it aboard a U.S. flight, NASA said. The 90-second spot was filmed July 25 on Mir -- a month after the space station's collision with a cargo ship. [Florida Today, August 21, 1997, p 8A.]

August 21: NASA TRIES TO GET SOJOURNER BACK ON TRACK

The Sojourner rover tried but failed to move from its awkward position straddling a Martian rock named Wedge, Mars Pathfinder controllers said Thursday. The rover executed the commands to move it away from the 1½-foot rock, but a malfunctioning gyroscope kept it from following the orders precisely, said flight director Rob Manning at NASA's Jet Propulsion Laboratory. "The gyro on board is drifting a little bit too much," project manager Brian Muirhead said. "We're finding it has a tendency to turn left, it has a bit of a hook. We're having to compensate for that." Two of Sojourner's wheels will remain on the rock until at least today, when officials will have another opportunity to send commands. [The Orlando Sentinel, August 22, 1997, p A-16.]

August 22: MIR CREW CONNECTS LAB CABLES

A simple whirring vibration stirred in what minutes before had been a soundless, airless and motionless lab. That spinning fan heralded a possible resurrection of life in the dead Spektr lab, a likely boost in power to the crippled Mir space station and success for Russian spacewalkers Friday. The daring five-hour internal spacewalk went as well as NASA and Russia had hoped. Using their hands and just one screwdriver, two spacewalkers connected crucial power cables with unexpected speed.

The retrieved equipment from the dead lab. They searched for holes in Spektr's damaged hull but found none. "This is a super day. We carried out everything that we set out to do and more," said U.S. astronaut Michael Foale, who waited in the Soyuz escape capsule. "Well done, everybody." Space officials may not learn until Monday whether the spacewalk has resulted in restoring more power to Mir. The cosmonauts -- who were up for 22 hours Friday -- are getting the weekend off to rest. They are not expected to test whether power has been restored until Monday. [The Orlando Sentinel, August 23, 1997, p A-1 & A-12.]

PIECES OF LIFE ON BOARD CASSINI

The digital disk that was placed on the Cassini spacecraft Friday, includes 616,400 signatures from people all over the world. "It's a nice opportunity to have something of yourself go into space," said Wendy Johnson, who works for NASA at Kennedy Space Center. "It's a chance to leave the planet." At rest for now at KSC, Cassini is to begin its 6½-year journey Oct. 6 aboard a Titan rocket from Cape Canaveral Air Station. NASA has been sending signatures on its planetary probes since the 1960s, but Cassini will be the first to carry John Hancocks of people who didn't work on the project. After NASA sent out the call, thousands of postcards and letters began arriving at the Jet Propulsion Laboratory in Pasadena, Calif., where Cassini was designed and built. "We weren't expecting such an upswell," said Charley Kohlhasse, Cassini's science and mission design manager. In all, people from 81 countries participated. Tough-guy actor Chuck Norris was among them. So was fellow actor Patrick Stewart, who played Capt. Jean Luc Picard on the TV show "Star Trek: The Next Generation." Not all those who signed are still among us. Among the dead are the signatures of 17th-century astronomers Jean Dominique Cassini and Christian Huygens -- whose names were given to the spacecraft and the probe that it carries to drop on the Saturn moon Titan. Cassini is to arrive at Saturn in 2004, exploring its rings, moons and atmosphere through the year 2008. [Florida Today, August 23, 1997, p 4A.]

EG&G FLORIDA LAYS OFF NEARLY 190

EG&G Florida sent pink slips to nearly 190 workers Friday, finalizing plans to reduce its work force by about 9 percent. The electronics giant, which owns the \$1.7 billion base operations contract for Kennedy Space Center, announced the job cuts July 28, but didn't specify where the layoffs would occur. EG&G officials said \$20 million in NASA budget cuts over the past three fiscal years forced their hand. Layoffs will take effect Sept. 5. [Florida Today, August 23, 1997, p 1B.]

August 24:

ACE POSTPONED 24-HOURS RESCHEDULED FOR 10:39 A.M. AUG. 25

The launch of a Boeing Delta II rocket with NASA's Advanced Composition Explorer

(ACE) has been rescheduled for Monday, Aug. 25 at 10:39 a.m. EDT at the opening of a 25 minute window. Launch was scrubbed today by Air Force range safety personnel due to two commercial fishing vessels located about 23 nautical miles offshore from launch pad 17A. The boats were within the Delta's launch danger area, a location where the solid rocket motors would drop into the sea after being jettisoned from the Delta's first stage. Air Force weather forecasters indicate a 20 percent chance of weather violating launch weather criteria tomorrow due to a chance of clouds and showers in the launch area. The spacecraft will spend the next 2-5 years measuring solar particles and other solar phenomena and provide early warnings of solar storms. [NASA News Release #146-97, August 24, 1997.]

August 25:

OXYGEN SYSTEMS BREAK DOWN ON MIR

The three men aboard Russia's run-down Mir space station were left without any way to generate oxygen Monday after both their primary and backup systems failed, at least temporarily, NASA reported. After a quick attempt to fix the problem failed Monday night, cosmonauts planned to try again early today. NASA expects either the main or backup oxygen system to be operational soon. Cosmonauts were trying to use the back-up oxygen system, a candle that burns and creates oxygen like on jetliners. But that didn't work, NASA officials said. So cosmonauts turned on the main machine, which makes oxygen out of wastewater. That system shut down after seven minutes. [The Orlando Sentinel, August 26, 1997, p A-1 & A-6.]

'ACE' SPEEDS TOWARD ORBIT TO STUDY SUN

One of NASA's cheapest spacecraft rocketed toward the sun Monday at 10:39 a.m. on a five-year mission to study atomic particles and provide advance warning of solar storms. The \$110 million solar observatory, called Ace, was hoisted by an unmanned Delta II rocket from launch pad 17A. On-board cameras provided spectacular views of Earth and the burning boosters as the rocket sped out over the Atlantic Ocean. Ace, short for Advanced Composition Explorer, will spend the next four months hurtling toward a point 1 million miles from Earth and 92 million miles from the Sun, a spot where the gravity of Earth and the gravity of the sun balance each other. It is the fourth NASA spacecraft to be launched to that spot. [The Orlando Sentinel, August 26, 1997, p A-6. KSC Countdown, August 26, 1997.]

SURVEYOR ON TRACK FOR MARS ORBIT

The flight path of the Mars Global Surveyor, a spacecraft that will spend nearly two years mapping the Red Planet, was adjusted Monday to prepare for an orbit that begins next month. The spacecraft fired its rockets for 11 seconds, which puts the spacecraft "on target for its arrival at Mars on Sept. 11," said Pasquale Esposito, Mars Global Surveyor navigation team chief at NASA's Jet Propulsion Laboratory. The spacecraft was launched Nov. 7, 1996, from Kennedy Space Center. [Florida Today,

August 26, 1997, p 2A.]

LEWIS SPACECRAFT ENCOUNTERS DIFFICULTIES

NASA's Earth-orbiting Lewis spacecraft has entered a spin that has disrupted the spacecraft's power-generating capability, raising the potential of the loss of the mission. Lewis was launched successfully on Aug. 22 at 11:51 p.m. PDT from Vandenberg Air Force Base, CA, about a Lockheed Martin Launch Vehicle (LMLV-1). Built by TRW Space & Electronics Group, Redondo Beach, CA, Lewis is part of NASA's Small Spacecraft Technology Initiative. Initial operations and check-out of Lewis were proceeding satisfactorily until telemetry received at 6 a.m. EDT today at the mission's Chantilly, VA, control center indicated that the spacecraft was spinning at approximately two revolutions per minute. Preliminary indications are that excessive thruster firing had occurred on one side of the spacecraft, causing it to spin when it should be stable on all three axes. The solar arrays on Lewis were unable to generate full power due to the spinning motion, and the batteries were discharged below operational levels. Four subsequent attempts to contact the spacecraft was unsuccessful. [NASA News Release #97-182, August 26, 1997.]

NATIONAL SPACE CLUB EVENT DRAWS STELLAR CROWD TO KSC

A stellar crowd turned out to hear Jet Propulsion Lab Director Dr. Ed Stone talk about the Mars Pathfinder mission at the National Space Club -- Florida Committee's annual meeting Thursday evening. About 365 community "stars" had an opportunity to mingle and meet the National Medal of Science recipient at a reception in the Galaxy Center at the Kennedy Space Center Visitor's Complex before Dr. Stone presented a travelogue of slides taken of Pathfinder's trip to the frigid red planet. [Florida Today, August 26, 1997, p 1D.]

August 26: COUNTY READY FOR CASSINI PROTESTERS

A force of 121 state and county police officers will stand guard outside Cape Canaveral on Oct. 4, when 5,000 peace activists are expected to protest the launch of NASA's Cassini spacecraft. The officers will help the U.S. Air Force keep protesters from entering the launch pad area, while marine and air units from the state and Brevard County will help the U.S. Coast Guard watch the restricted area at sea. Peace activists have vowed to use any means to stop the launch of the \$3.2 billion rocket -- including walking through swampland and parachuting onto the site -- because it will be carrying 72 pounds of radioactive plutonium. Police and protesters anticipate arrests during the nonviolent demonstration. The Cassini launch is not the first time NASA launches have been targeted by protesters. In 1987, 4,000 people demonstrated against an unarmed test flight of a Trident 2 nuclear missile. There were 138 arrests of people trying to climb the Air Station's gate. [Florida Today, August 27, 1997, p

1A.]

CREW BREATHE EASIER ON MIR

The crew on Russia's electrically sapped space station Mir charged ahead with a crucial power-restoration job Tuesday after quickly fixing two balky air supply systems on the ailing outpost. With both oxygen generation systems on Mir working again, the crew continued to restart systems that were shut down to conserve electricity after a June 25 cargo ship crash cut station power in half. The swift fix-it job ended an overnight scare in the United States and left Russian officials wondering why their NASA counterparts told Western media outlets the Mir crew, which includes U.S. astronaut Michael Foale, might have to abandon ship. The apparent communications problem pointed up the difficulties NASA and its Russian partners face in trying to work together in time zones that are eight hours apart. [**Florida Today**, August 27, 1997, p 2A.]

GENESIS PERFORMANCE

Atlantic recording group "Genesis" launched their new album entitled "Calling All Stations" live from the Apollo/Saturn V Center on Thursday. The radio performance was highlighted by an exclusive Genesis interview and a special, in person, acoustic performance by the group. [**KSC Countdown**, August 21, 1997.]

August 27:

NASA IS TESTING ROBOT FOR RISKY JOB

It might be the most dangerous job at Kennedy Space Center -- and it's not flying into space. Workers go into a place nearly as dark: the ocean. After every space shuttle launch, divers retrieve the two massive, reusable solid-rocket boosters that drop into the Atlantic. Four or five of them have to grapple a 1,100-pound, 22-foot plug and shove it in the open end of each booster. All this happens while the 149-foot boosters bob up and down on the surface and lurch from side to side. They can shift suddenly and smack a diver. The plugs have to be twisted into the boosters to keep them from filling with water and sinking. After they are plugged, air is pumped into the boosters so they will float and can be towed back to KSC. NASA is considering eventually replacing or supplementing the divers with robots. This week they are testing an 8-foot robotic submarine that was built by a Massachusetts company for commercial underwater exploration. The robot has its shortcomings. "It doesn't have the reasoning. It can't plan; it can only execute," said John Fischbeck, booster recovery chief for the United Space Alliance, which also runs shuttle operations for NASA. But NASA and the space alliance are worried about safety. "In our meetings, they say it is the single most dangerous job at KSC," said Tom Lippitt, section leader for NASA's advanced systems lab. [**The Orlando Sentinel**, August 28, 1997, p C-6.]

August 28: MIR CREW FLIPS ON POWER IN DORMANT MODULE

The crew of the Mir space station flipped on power in a long-dormant module Thursday and made plans to begin training in their spacesuits for an upcoming spacewalk. The training schedule and remarks by Russian officials made it seem increasingly likely that U.S. astronaut Michael Foale will be allowed to participate in the spacewalk, tentatively set for Wednesday. NASA has not given formal approval for Foale to take part in the spacewalk, in which he and Mir Commander Anatoly Solovyov are expected to look for holes in the side of a damaged module. But Russian officials seem to have accepted it as a done deal. Today, Solovyov and Pavel Vinogradov made a trip into Spektr, which was depressurized in the collection, and managed to reconnect three of its solar panels to Mir's power system. That should bring Mir up to 90 percent of its original power. The shuttle Atlantis is expected to dock with Mir around the end of September, bringing U.S. astronaut David Wolf to replace Foale and delivering some repair gear. [Florida Today, August 29, 1997, p 2A.]

August 29: MIR REPAIRS FORCE DELAY IN SPACEWALK

Slow progress in repairing the ailing Russian space station Mir has prompted the postponement of a spacewalk planned for next Wednesday by two or three days, officials said Friday. The delay in the spacewalk to find holes in the space station also will give American astronaut Michael Foale more time to train. Foale and Mir Commander Anatoly Solovyov are supposed to inspect the outside of Mir's Spektr module, damaged in a crash with a cargo vehicle in June, and patch any holes they find in its hull. Foale has only taken a spacewalk once, in February 1995, and never before in a Russian spacesuit. [The Orlando Sentinel, August 30, 1997, p A-11.]

August 30: AMONG MARS DISCOVERIES: MORE PUZZLES

After collecting hundreds of floppy disks' worth of data and snapping more than 10,000 pictures, the Mars Pathfinder mission has achieved its primary goal, doing everything its designers could have wished. But for scientists, the mission has raised more questions than it has answered about the planet of pink sky and blue sunsets, where tilted rocks stand testament to a billion-year-old flood that mysteriously bubbled up from the ground. This first look at Mars in 20 years was intended primarily as an engineering mission, but the stripped-down payload of scientific instruments made some surprising -- and puzzling -- findings. Thermometers on the lander measured temperature swings of more than 40 degrees Fahrenheit from minute to minute, and, stranger still, the temperature near the ground got up to 70 in some spots but remained below 15 degrees 5 feet up. Less surprising were the water-swept arrangements of rocks, confirming evidence of a flood, the aftermath of which was first seen in shorts from the Viking orbiter in 1976. But mystery still surrounds the cause of this flood, which carried the equivalent of the Mediterranean Sea through the area and swept in a

hodgepodge of rocks. Perhaps some of these puzzles will clear up as future missions go beyond the floodplain called Ares Vallis and into more of Mars' varied landscapes. [The Orlando Sentinel, August 31, 1997, p A-13.]

During August:

KSC MAKES PRESTIGIOUS CIO 100 LIST

KSC has made it to the Chief Information Office 100 (CIO 100) list published by CIO magazine. The 100 winners will be listed in the August 1997 issue. The KSC CIO office is headed by Jimmy Aiken. [Spaceport News, August 25, 1997, p 2.]

BOEING IS BEING OFFERED \$37 MILLION IN TAX CREDITS

Boeing is being offered \$37 million in tax credits by Brevard County, Fla., to locate the production line for new Delta 4 launch vehicles in the county if the company wins the U.S. Air Force contract for the Evolved Expendable Launch Vehicle (EELV). Lockheed Martin, the other EELV finalist, would base its production in Colorado. Boeing, which gained control of the Delta program in its merger with McDonnell Douglas, is also considering EELV plant sites in Bay St. Louis, Miss., and Huntington Beach, Calif., which are offering their own incentive packages. The Air Force plans to pick an EELV winner next year. [Aviation Week & Space Technology, August 25, 1997, p 65.]

U.S. AIR FORCE AND NASA TIGHTENING SECURITY

The U.S. Air Force and NASA are tightening security at both Cape Canaveral Air Station and the Kennedy Space center to guard against any attempts by nuclear protesters to sabotage or disrupt the planned Oct. 6 launch of the nuclear-powered NASA Cassini spacecraft to Saturn on board a Titan 4B booster. More stringent identification badge checks, car inspections, and personnel controls are being exercised. Security patrols are being increased, new razor wire is being added to fences, and additional motion detectors are being installed around the Titan launch pad complex. [Aviation Week & Space Technology, August 25, 1997, p 65.]

SEPTEMBER

September 1:

SPACEWALKERS TO SEARCH FOR MIR'S HARD-TO-FIND LEAKS

Finding leaks in pipes isn't easy. Now take that plumbing challenge and move it to the crippled and leaky space station Mir. In space, hull leaks are deadly. And they are much harder to find than cracks in pipes underneath a toilet because there are more places to hide. In a task that some experts doubt will succeed, two spacewalkers, a Russian and probably American Michael Foale, will scour Mir's exterior for six hours looking for holes. They will also install a new valve on Mir. When a garbage-toting cargo ship crashed into Mir's Spektr lab on June 25, it punctured the 11-year-old station's newest room. Spektr was sealed and now is dark and airless. But if Russia ever hopes to revive Spektr, where half of the U.S. projects are conducted, the leaks must be found. If the leaks can be located, an attempt will be made this fall to patch them. [The Orlando Sentinel, September 1, 1997, p A-12.]

September 2:

ASTRONAUT STORY MUSGRAVE RETIRES FROM NASA

Veteran astronaut F. Story Musgrave retired from NASA today to pursue private interests in the communications industry. Musgrave's NASA career spanned the Apollo era to the Space Shuttle program into initial development of spacewalk strategies for the International Space Station. Musgrave, 62, joined NASA in 1967 and is a veteran of six Space Shuttle flights. [NASA News Release #97-188, September 2, 1997.]

TWO VOYAGER SPACECRAFT STILL GOING STRONG AFTER 20 YEARS

Twenty years after their launch and long after their planetary reconnaissance flybys have been completed, both Voyager spacecraft are now gaining on another milestone -- crossing the invisible boundary that separates our solar system from interstellar space, the heliopause. Voyager 2 was launched first on Aug. 20, 1977, and Voyager 1 was launched a few weeks later on a faster trajectory on Sept. 5. Initially, both spacecraft were only supposed to explore two planets -- Jupiter and Saturn. But the incredible success of those two first encounters and the good health of the spacecraft prompted NASA to extend Voyager 2's mission to Uranus and Neptune. Both spacecraft have enough electrical power and attitude control propellant to continue operating until about 2020 when the available electrical power will no longer support science instrument operation. Voyager 1 is currently 6.3 billion miles (10.1 billion kilometers) from Earth, having traveled 7.4 billion miles (11.9 billion kilometers) since its launch. Voyager 2 is currently 4.9 billion miles (7.9 billion kilometers) from Earth, having traveled 6.9 billion miles (11.3 billion kilometers) since its launch. [NASA News

September 3:

**MAJ. LAWRENCE'S NAME TO BE ADDED
TO SPACE MIRROR**

Ceremonies will be Dec. 8 at the Kennedy Space Center Visitor Complex to mark adding the name of the first African-American astronaut, Maj. Robert Lawrence, to the Space Mirror. Lawrence was flying a training mission on Dec. 8, 1967, when his P-104 Starfighter jet crashed. At the time of his death, he was an astronaut-in-training for the Manned Orbital Laboratory Program. His name was not included in the Astronaut Memorial Foundation Space Mirror when it was dedicated in 1991 because in 1967 Manned Orbital Lab trainees were not officially considered astronauts. A national campaign to have Lawrence's name added to the list of astronauts culminated in January with the Air Force officially designating Lawrence an astronaut. After that, the Astronaut Memorial Foundation unanimously voted to add Lawrence's name to the monument. [Florida Today, September 3, 1997, p 3B.]

NASA TAKES PROBE OFF PAD FOR REPAIRS

A cooling system that pumped air three times stronger than intended tore insulation in a mini-probe inside Cassini. The damage forced NASA to remove Cassini from its perch atop a Titan IV-B rocket for a quick patch job, officials said Wednesday. The \$3.3 billion project was scheduled to launch from Cape Canaveral Air Station on Oct. 6 but probably will be delayed until mid-October, NASA officials said. But if there is more damage than expected, it could force NASA to miss its main launch opportunity, which ends Nov. 4. If that happens, it would take 27 more months for Cassini to reach Saturn and its moons and cost NASA about \$120 million more, program manager Richard Spohalski said. Cassini was placed on its rocket Aug. 28. The next day NASA noticed the air conditioner that cools 34 radioactive heaters inside the miniprobe was pumping air at more than 400 mph. That probe separates from Cassini and plummets to Saturn's moon Titan. On Tuesday, officials realized the blasting air caused a 2-inch rip in the foam-and-foil insulation. Technicians will try to fix the rip with spare insulation. [The Orlando Sentinel, September 4, 1997, p A-4.]

**COMMUNICATIONS SATELLITE FAILS TO
MAKE IT OFF GROUND**

Fuel-pressure problems in an Atlas IIAS rocket delayed a Wednesday launch of a communications satellite. Lockheed Martin and the U.S. Air Force will try to launch the rocket again today at Cape Canaveral Air Station at 8:03 a.m. The rocket carries a 6,272-pound satellite for GE American Communications Inc. to provide television and data services to the United States. [The Orlando Sentinel, September 4, 1997, p A-5.]

RUSSIANS WILL JUNK MIR BY 1999

Russia will end activities on the orbiting Mir space station toward the end of next year and send it crashing down into the Pacific Ocean in early 1999. Boris Ostroumov, deputy director of the Russian Space Agency, said in an interview Wednesday that Mir's demise will come shortly after cosmonauts take up residence in the new international space station in January 1999. "There might be some period when both are in orbit, but it won't last long," he said, providing the first detailed timetable for Mir's death. "We just can't support two programs." [The Orlando Sentinel, September 4, 1997, p A-5.]

September 4: GE-3 SATELLITE SUCCESSFULLY PUT INTO ORBIT

A communications satellite that will be used by public television and several cable networks was successfully launched Thursday from Cape Canaveral Air Station. The GE Americom satellite, dubbed GE-3, streaked into orbit aboard a Lockheed Martin Atlas 2AS rocket right on time at 8:03 a.m. After a 30-day period for positioning and testing, the satellite is scheduled to join two sister spacecraft in beaming broadcast and data signals across the United States and Caribbean for the next 17 years. Thursday's Atlas launch is the fifth of nine Lockheed Martin has scheduled this year from the air station. The next launch is scheduled for Sept. 29, when an Atlas 2AS will carry an EchoStar satellite into orbit. [Florida Today, September 5, 1997, p 7A.]

NASA DELAYS CASSINI LAUNCH TO MID-OCTOBER

NASA is now aiming for a mid-October launch of its Cassini mission to Saturn as technicians make repairs to the spacecraft, officials said Thursday. Agency managers would not offer a specific launch date, saying it will depend on how quickly a small hole can be patched in the insulation of a probe that Cassini is to drop on the Saturn moon Titan. The mission was to start Oct. 6 with liftoff aboard a Titan rocket from Cape Canaveral Air Station. [Florida Today, September 5, 1997, p 7A.]

September 5: SPACEWALKERS LOOK AT MIR'S BATTERED HULL

In a six-hour mission expected to be completed today, American Michael Foale and Russian Anatoly Solovyev shimmied along a 50-foot boom through space toward the dented and punctured Spektr lab. They left Mir at 9:07 p.m., but shortly afterward the space station got out of communication range with Earth. Foale was the first to venture outside, followed by Solovgyev, who has walked in space a record 10 times. When Foale went outside he became the first person to have spacewalked in American and Russian spacesuits. He walked outside of a shuttle in 1995. [The Orlando Sentinel, September 6, 1997, p A-1 & A-7.]

September 6: SPACE WALKERS FAIL TO FIND MIR'S FLAWS

A U.S.-Russian spacewalking team failed to find holes in the damaged space station

Mir on Saturday, stalling an even more improbable job: repairing a lab many have given up for dead. But the orbital mechanics did manage to point two power-producing solar panels toward the sun -- a pivotal move in an ongoing bid to restore electricity lost in a potentially deadly June 25 cargo ship crash into Mir. "We could not find the exact location where the leak happened," admitted Russian chief flight director Vladimir Solovyov. "Not pinpointing it make it impossible to repair," added NASA shuttle-Mir project manager Frank Culbertson. Nonetheless, officials said the work done by U.S. astronaut Michael Foale and Mir commander Anatoly Solovyov -- who is no relation to the Russian flight director -- will lead to the restoration of 85 percent to 90 percent of full power at the station. [Florida Today, September 7, 1997, p 1A.]

September 7:

MIR CREW PREPARES FOR SHUTTLE ATLANTIS' ARRIVAL

As power steadily grows aboard the Russian space station Mir, the three crewmen will test life-support equipment this week to prepare for the planned Sept. 28 arrival of shuttle Atlantis. Mir commander Anatoly Solovyev, flight engineer Pavel Vinogradov and NASA astronaut Michael Foale were to rest today after the grueling six-hour spacewalk Saturday. Atlantis is scheduled to be launched Sept. 25 from Kennedy Space Center. Among Atlantis' six crew members will be Foale's replacement, astronaut David Wolf. [Florida Today, September 8, 1997, p 2A.]

MARS SKY CAM WILL BE ROVER'S SIDEKICK

After two months of tooling about the martian surface, Pathfinder's tiny but determined rover, Sojourner, has given Earth a new ground-level perspective on its neighbor. Now the National Aeronautics and Space Administration is about to get an altogether different view of Mars -- from high above. On Thursday night (September 11), a \$155 million probe called Mars Global Surveyor will reach the Red Planet on a two-year mission to take pictures and map the planet. Launched from Cape Canaveral a month apart in 1996, the two NASA probes are nearly mirror images of each other. Although Pathfinder has produced science data, it was built to test new technology. Global Surveyor is science oriented. [The Orlando Sentinel, September 8, 1997, p A-9.]

September 8:

COMPUTER CRASH HOBBLER MIR AGAIN

The Mir's onboard computer, which seems to have a mind of its own, broke down again Monday and forced the crew to shut down most of the space station's equipment. Russian and U.S. space officials downplayed the seriousness of the computer crash, the third aboard Mir since mid-July. The station maintained its orientation toward the sun, and its power supplies were in much better shape than during the previous breakdowns. Ground controllers said they hoped to repair and restart the computer

today. Meanwhile, they said, the crew was in no danger. [Florida Today, September 9, 1997, p 2A.]

CASSINI STUDY FLAWED, ACTIVISTS CONTEND

NASA isn't telling the truth about the health risks posed by radioactive plutonium fuel aboard its Cassini probe set for launch next month, a coalition of scientists, environmentalists and peace activists said Monday. If there is a launch pad explosion or if the craft re-enters Earth's atmosphere during a flyby, the nuclear fuel could rain down on populated areas with deadly consequences, said Bruce Gagnon, coordinator of the Florida Coalition for Peace and Justice, an advocacy group opposed to nuclear fuel and weapons in space. NASA officials disputed the group's claims that the space agency's risk analysis is flawed. "We are leveling with the American people," said Brian Welch, director of news and information at NASA headquarters. "We wouldn't proceed if we thought it was unsafe." The \$3.4 billion Cassini mission is scheduled for launch in mid-October from Cape Canaveral Air Station aboard an Air Force Titan 4 rocket, the largest unmanned launch vehicle in the U.S. fleet. [Florida Today, September 9, 1997, p 2A.]

4 ARRESTED AT RALLY AGAINST NUCLEAR-POWERED SPACE PROBE

Scientists and opponents of the nuclear-powered Cassini Saturn probe on Monday got the attention they've been looking for as they protested outside the White House. The group, including a former NASA emergency preparedness expert, drew about 15 cameras and dozens of reports -- including some from other countries -- to a news conference. Members said the probe could rain deadly plutonium on Florida or other parts of the world. But the protesters may not have attracted the attention of one person they needed -- President Clinton. They want Clinton to scrub next month's launch, but the White House passed off questions to NASA, which defended the safety of the nuclear probe. Four people were arrested by U.S. Park Police when they refused to move from in front of the White House. They were charged with demonstrating without a permit. The Cassini probe, carrying 72.3 pounds of plutonium, is scheduled to launch on or after Oct. 6. Previous space probes have carried plutonium and have raised similar concerns. But the Cassini probe would be the largest amount of plutonium sent into space. [The Orlando Sentinel, September 9, 1997, p A-6.]

September 9:

MIR CREW MEMBERS REPLACE BALKY COMPUTER

The space station Mir's crew replaced its worn-out computer and restored all systems to normal Tuesday, a day after the computer mysteriously shut down for the third time in as many months. Vladimir Solovyov, chief of Russia's Mission Control, said the

repair effort was handled smoothly and the Russian-American crew was never in any peril. The repair effort required the crew to replace the central block of the main computer and then install the software, officials said. Unlike previous breakdowns, the station was able to maintain its orientation toward the sun, and its power supplies were in much better shape this time. [Florida Today, September 10, 1997, p 2A.]

September 10:

**LAUNCH OF LUNAR PROSPECTOR
RESCHEDULED FOR LATE NOVEMBER**

Launch of NASA's Lunar Prospector mission to explore the Moon has been rescheduled from late September to Nov. 23, 1997. The schedule change occurred because additional time is needed to complete testing and preparation of the new Lockheed Martin LMLV2 launch vehicle. Lunar Prospector is the first competitively selected venture in NASA's Discovery Program series of "faster, better, cheaper" space science exploration missions. The entire mission, including the 660-pound spacecraft, its launch vehicle, science instruments and data operations and delivery, has been developed at a total cost of \$62.8 million. Following its launch and cruise to the Moon, Lunar Prospector will orbit above the Moon's surface at an altitude of approximately 63 miles during a one-year mapping mission. [NASA News Release #97-193, September 10, 1997.]

September 11:

**NASA, DOD AND FAA SIGN JOINT AGREEMENT
ON SPACEPORTS LAUNCH GUIDANCE**

The NASA Administrator, the Under Secretary of Defense for Acquisition and Technology (DOD) and the Federal Aviation Administration (FAA) Administrator have signed a joint Memorandum of Agreement (MOA) that provides guidance for federal interaction with commercial launch site operators on spaceports. A "spaceport" will be similar to an airport for rockets and will be managed by a launch site operator. Operation of a launch site consists of operations and maintenance of launch property, which must include at least one launch pad. These operators may be state government agencies, state-chartered or -sponsored entities, or commercial organizations. The primary objective of the MOA is to facilitate and encourage access by the private sector and state and local governments to excess federal launch property and services. The MOA explains the respective roles and responsibilities of federal agencies in general and specifically NASA, DOD and FAA, in their interactions with launch site operators. The intent is to minimize the regulatory burden on the U.S. commercial space sector by clearly delineating federal agency requirements and oversight responsibilities, eliminating overlap and duplication. The guidance applies to current and prospective FAA-licensed launch site operators on, or outside, federal installations. It does not apply to operation of a launch site performed as part of a federal space activity carried out by, or for, the federal government. [NASA News Release #97-194, September 11, 1997.]

THINGS MOVING PERFECTLY FOR SURVEYOR'S MARS ORBIT

The Mars Global Surveyor spacecraft was in "picture-perfect shape" Wednesday as it prepared to rendezvous with the Red Planet, officials said. Surveyor, designed to circle Mars for two years looking for landing sites for future manned mission, is expected to go into orbit tonight after a 10-month journey. The tiny robotic craft will offer scientists a view of the planet's climate and weather patterns not available to the Pathfinder rover, which has been beaming back data since July 4. Surveyor will not start its primary mission of mapping the planet for at least four months. [The Orlando Sentinel, September 11, 1997, p A-10.]

September 11:

NASA AIDE SAYS MIR'S PROBLEMS THREATEN SAFETY OF ASTRONAUTS

Just two weeks before the next shuttle flight to Mir, NASA's Inspector General is raising concern over "serious problems" with Russia's space station that threaten astronaut safety. The letter from Inspector General Roberta Gross to the chairman of the House Science Committee, Representative F. James Sensenbrenner Jr., Republican of Wisconsin, provides a troubling and frightening glimpse at life aboard the aging Mir over the past two years, as seen through the eyes of its first four American occupants. A NASA spokeswoman, Debra Rahn, said the space agency would have no comment about Ms. Gross's letter until later. In her 13-page letter, Ms. Gross referred to the Feb. 23 fire and the June 25 collision with a cargo ship as "obvious red flags" and noted "there are other serious problems associated with the Russians' aging space station which pose risks to the Mir crew." [The New York Times, September 12, 1997, p A10.]

ORBITING CRAFT IS ON TRACK TO MAP THE TERRAIN OF MARS

Putting on the brakes with a steady blast of rocket exhaust, an American spacecraft eased into a wide orbit of Mars to spend two years mapping the planet's mountains and canyons, icy polar caps and windswept flood plains. The Mars Global Surveyor became the first spacecraft in 21 years to orbit the neighboring planet successfully. Its arrival was greeted with joy and relief because the last attempt, by Mars Observer in 1993, failed just three days before it was to reach orbit. After a journey of 10 months and 435 million miles, the 1,700-pound Surveyor sped with true aim toward a point 186 miles above the Martian north pole. Surveyor achieved orbit shortly before 7 p.m. Pacific time (10 p.m. Eastern time). Further maneuvers over the next four months are planned to lower and circularize Surveyor's orbit in preparation for photographing the entire planet over the course of one complete Martian year, the equivalent of nearly two Earth years. [The New York Times, September 12, 1997, p A11.]

NASA WORKER SUSPENDED FOR 2 DAYS

A NASA employee who has publicly protested the space agency's controversial Cassini mission to Saturn was suspended this week for an unrelated work infraction. James Ream, 56, of Mims was suspended without pay Thursday and Friday. He is scheduled to return to work Monday as a facilities engineer at Kennedy Space Center. NASA officials say the punishment has nothing to do with his opposition to Cassini, a \$3.3 billion mission that will use radioactive plutonium fuel to power the probe's instruments. "He had some work to carry out, and he was not doing that work," said Ken Aguilar, KSC's director of personnel. Ream is appealing the suspension, which NASA says centered on his failure to obey directions to order \$45,000 worth of office partitions. Ream says he did not carry out the request because the partitions were not going to be used in accordance with government regulations. He was told to order them anyway on July 15, but refused. [Florida Today, September 13, 1997, p 2A.]

September 12: VETERAN SHUTTLE COMMANDER RETIRES

Shuttle astronaut and Russian space station Mir veteran, John Blaha (Col., USAF Ret.), will retire from NASA on Sept. 26 to become the Assistant Vice President, Integration Engineering, for USAA Corporation in San Antonio, TX. [NASA News Release #97-196, September 12, 1997.]

REPAIR WORK ON CASSINI HUYGENS PROBE COMPLETED SUCCESSFULLY

Engineers at Kennedy Space Center have completed repairs to damaged thermal insulation on the European Space Agency's Huygens probe, a part of the Cassini mission to Saturn. Based on the amount of time needed to return the spacecraft to the pad from a spacecraft checkout facility and complete the work necessary to be ready for launch, NASA managements have set a tentative launch date of no earlier than Oct. 13. The launch date will be confirmed by the Air Force after the spacecraft has been mated to the Titan IV/Centaur next week. [NASA News Release #97-198, September 12, 1997.]

ATLANTIS' SEVENTH MISSION TO MIR SET FOR SEPTEMBER 25

Space Shuttle Program managers today unanimously approved plans for a September 25 launch of the seventh shuttle mission to rendezvous and dock with Russia's Mir Space Station to deliver supplies and return Mike Foale from the outpost following his four month stay. Astronaut Dave Wolf has completed training and is scheduled to replace Michael Foale for a four-month stay on Mir to continue the permanent U.S. presence on the station that began with Shannon Lucid on the STS-76 mission in 1996. The launch window opens at 10:34 p.m. EDT and closes about 7 minutes later

at 10:41 p.m. Following a nominal flight duration of 9 days, 20 hours, 24 minutes, Atlantis is scheduled to land at the Kennedy Space Center at about 6:58 p.m. EDT, October 5. [NASA News Release #97-199, September 12, 1997.]

OFFICIALS BOOST PENALTY FOR LAUNCH PROTEST TACTIC

With the launch of a plutonium-powered Saturn probe now perhaps a month away, security officers are contemplating tough charges against any protesters who try to stop the mission with children in tow. Brevard County deputy sheriffs warned this week that cassini protestors who help children over the gates at Cape Canaveral Air Station could be charged with felony child abuse. Children have figured in other local protests. "I would do anything I could to prevent someone from putting a child in a situation where they could be harmed," said Bob Sarver, sheriff's chief of operations. Bruce Gagnon, leader of the protests, said he expects some of Cassini's opponents to try to enter restricted areas of the Air Force facility between the planned Oct. 4 demonstration and the launch date. But he scoffed at the idea that Cassini's opponents would place children in any harmful position. "We love our people and would never do anything to hurt them. The danger is in the plutonium, not us," Gagnon said. [The Orlando Sentinel, September 13, 1997, p A-13.]

PUBLICLY, NASA SAYS MIR SAFE: PRIVATELY, THERE ARE WORRIES

Despite public pronouncements of safety and confidence in space station Mir, NASA privately has told Russia that conditions on the troubled outpost violate safety agreements. In an Aug. 11 letter obtained by *The Orlando Sentinel* through the federal Freedom of Information Act, NASA shuttle-Mir program manager Frank Culbertson said the Mir program is "in a precarious position." Culbertson's unusual letter to his Russian counterpart highlights NASA worries that Mir's drinking water supplies are getting too low and that the potential exists for a repeat of the February fire on Mir. Culbertson also questioned the way Russia operates the station. NASA must take a larger role in Mir's operations in the future, Culbertson concluded in his letter. [The Orlando Sentinel, September 13, 1997, p A-1 & A-13.]

September 15:

MIR'S LATEST POWER LOSS COMES AT BAD TIME

For the fourth time in about two months, space station Mir's main computer failed. The computer failure forced Mir's three-man crew to shut down power to much of the station because the outpost temporarily lost its ability to point its solar power panels toward the sun. NASA expects the power situation to be resolved today. An upgraded computer will be sent on a cargo ship, scheduled for launch in October, and a remodeled one may be brought up by space shuttle Atlantis on Sept. 25. [The

Orlando Sentinel, September 16, 1997, p A-4.]

September 16: SATELLITE GIVES MIR RESIDENTS A SCARE

A U.S. satellite came within 500 yards of crashing into the space station Mir, forcing its three occupants into an escape capsule because they feared a collision, Russian officials said Tuesday. Vera Medvedkova, spokeswoman at Russia's Mission Control, said it was Mir's closest brush with an unrelated spacecraft in its 11 years in orbit. It was a 370-pound research satellite traveling on a perpendicular orbit -- inoperative since shortly after its 1994 launch by the Ballistic Missile Defense Organization, an arm of the U.S. Defense Department. The U.S. Space Command in Colorado Springs, Colo., had informed NASA of the close approach about 30 hours beforehand, and NASA in turn informed the Russians. The Russian-American crew spent 30 minutes in the Soyuz until the danger passed, Medvedkova said. [Florida Today, September 17, 1997, p 1A & 2A.]

September 17: MIR REGAINS LIGHTS, POWER, OXYGEN SYSTEM

After a crippling computer breakdown and a near-miss with a satellite, the embattled Mir space station returned to near-normal Wednesday as lights, oxygen and more power came back on line. the Russian-American crew which had to burn oxygen "candles" for three days to save power, turned the main oxygen supply system back on Wednesday. The space station's orientation system also returned on line, keeping the station pointed toward the sun and recharging solar batteries drained during the computer mishap. Six of 10 gyroscopes that orient the station were working by evening, and the rest were to be put into operation overnight. After several days of repair work, the two Russian cosmonauts also were able to resume scientific experiments, the Interfax news agency reported. American astronaut Michael Foale worked on his "greenhouse" experiment and packed equipment he'll take home on the U.S. space shuttle Atlantis, set to blast off one week from today carrying supplied, a backup computer and Foale's replacement, David Wolf. [Florida Today, September 18, 1997, p 9A.]

**MARS GLOBAL SURVEYOR DETECTS MARTIAN
MAGNETIC FIELD AS AEROBRAKING BEGINS**

Scientists have confirmed the existence of a planet wide magnetic field at Mars using an instrument on-board NASA's Mars Global Surveyor orbiter, as the spacecraft began to circle and study the planet from a highly elliptical orbit. The existence of a planetary magnetic field has important implications for the geological history of Mars and for the possible development and continued existence of life on Mars. [NASA News Release #97-204, September 17, 1997.]

September 18: PANEL TO NASA: STAY OFF MIR

Congressional leaders made their feelings unmistakably clear: Russia's battered space station Mir is no longer safe, and no more American should be sent there. That was the message Thursday from the House Science Committee, whose members held a hearing on Mir safety that examined two near-fatal accidents this year. But top NASA officials disagreed and said they were pushing ahead with next Thursday's planned launch of shuttle Atlantis to dock with Mir. The ship is to pick up astronaut Mike Foale and drop off his replacement, David Wolf. "There has been sufficient evidence put before this hearing to raise doubts about the safety of continued American long-term presence on the Mir," said Rep. F. James Sensenbrenner, R-Wis., chairman of the committee. If Wolf does go, he said, NASA Administrator Daniel Goldin will have "some explaining to do, and I will give him the opportunity." Added Rep. George E. Brown Jr., D-Calif.: "The administrator has been forewarned that he makes that decision at his own risk." NASA spokeswoman Peggy Wilhide said Goldin believes Mir's safety has been thoroughly evaluated by an experienced NASA flight operations team, and there was "no technical rationale to believe the Mir is unsafe." **[Florida Today, September 19, 1997, p 1A & 2A.]**

COST OF SPACE STATION FLIES HIGHER

The price tag for the international space station continues to grow despite an annual spending cap imposed by Congress, a Senate panel was told Thursday. NASA Administrator Dan Goldin told senators that work on the new station likely will cost U.S. taxpayers an additional \$430 million in the next fiscal year. He attributed the increase to two factors -- cost overruns by the project's prime contractor, Boeing, and uncertainty whether Russian will deliver a key component on time next year. Boeing experienced unexpected delays in developing hardware as well as software for the planned orbiting outpost. Additionally, the company may have been overly optimistic in its initial planned estimates, Goldin said. As for the Russians, NASA plans to set aside \$100 million in case the Russian Space Agency defaults on delivery of the service module. If that happens, NASA will move ahead with a plan to build an interim service module, Goldin said. **[Florida Today, September 19, 1997, p 2A.]**

THERE'S LITTLE CHANCE CONGRESS WILL STOP SPACE STATION WORK

NASA's international space station will almost assuredly get built, despite hundreds of millions of dollars in growing cost overruns. That's because of one thing that rests in a Kennedy Space Center hangar. It's a piece of the station. Actual metal with six miles of wire. Something you can touch. "They've got bent metal," said American University professor Howard McCurdy, who has written books about space station management. "They've laid the foundation. Once they laid the foundation, Congress will never make them pull it up." The United States has manufactured 200,000 pounds of the station. The first American-built part, a connecting passageway that measures 22 feet long, is at the KSC being prepared for a launch in the summer of

1998. [The Orlando Sentinel, September 19, 1997, p A-12.]

September 19: CASSINI LAUNCH RESCHEDULED FOR OCT. 13

The launch of NASA's Cassini spacecraft aboard a U.S. Air Force Titan IVB rocket has officially been rescheduled on the Eastern Range for Monday, Oct. 13. The payload is now back at Complex 40 atop the Titan IV Centaur. The launch window for Cassini extends from 4:55 to 7:15 a.m. EDT. Cassini is a joint NASA-European Space Agency (ESA) mission to Saturn, which is scheduled to arrive at the ringed planet in 2004 after more than six years of interplanetary travel. After arrival, the spacecraft will orbit Saturn for four years studying the gas giant planet, its rings and moons, and the ESA-built Huygens probe will descent to the surface of the giant moon Titan. [NASA News Release #97-207, September 19, 1997.]

ATTEMPTS TO CONTACT LEWIS SPACECRAFT
UNSUCCESSFUL; RE-ENTRY LIKELY NEXT WEEK

Repeated attempts to re-establish radio contact with NASA's Earth-orbiting Lewis spacecraft since it entered a slow spin on Aug. 26 have been unsuccessful. Due to increasing atmospheric drag, the spacecraft's orbit is deteriorating. Unless contact is regained early next week, it is expected to re-enter and burn up between Sept. 23-30, with Sept. 27 as the current most likely re-entry date, according to program officials. Lewis was launched on Aug. 22 (Aug. 23 EDT) from Vandenberg Air Force Base, CA. aboard a Lockheed Martin Launch Vehicle (LMLV-1). Built by TRW Space & Electronics Group, Redondo Beach, CA, the 890-pound Lewis satellite is part of NASA's Small Spacecraft Technology Initiative. [NASA News Release #97-208, September 19, 1997.]

YELTSIN AWARDS ASTRONAUTS FOR MIR DUTIES

Russian President Boris Yeltsin honored two American astronauts Friday for their experience aboard the Mir. Yeltsin issued a decree giving the Friendship Award to Jerry Linenger and John Blaha for "their contribution to the development of the Russian-U.S. cooperation in space exploration." Russian space officials hope to keep Mir in orbit at least through 1999. An international space station, which involves contributions from the United States, Russia, Japan and European nations, is expected to go into orbit next year, though it won't be completed until 2002. The U.S. space shuttle Atlantis is scheduled to blast off Thursday (Sept. 25) for a rendezvous with Mir. American Michael Foale, who has been on Mir since May, is to be replaced by David Wolf. [Florida Today, September 20, 1997, p 9A.]

LAUNCH COMPLEX 40 RAIL FIXED

Lufti "Lou" Mized, project engiener for AJT & Associates of Cape Canaveral,

addressed the American Society of Civil Engineers in Clearwater on the successful repair of the Launch Complex 40 rail transportation system at Cape Canaveral Air Station. Mized explained Sept. 19 how the troubled rail system for the mobile service tower was fixed for the Air Force's Titan 4 program. The rails were sinking so deeply into the sand that a girder of the mobile tower scraped a manhole cover. The problem threatened the use of the complex, AJT officials said. AJT engineers found that while the settlement of the rails could not be stopped, it could be slowed enough for the system to last the lifetime of the Titan 4 program. The company replaced existing foundations with more substantial footers. [Florida Today, September 21, 1997, p 1E.]

ARE SPACE JOBS AT RISK?

Cape Canaveral provided the perfect setting for a key topic of the state's economic summit on Friday: bolstering Florida's aerospace industry, in which Brevard County plays such a critical role. "The launch sector is very competitive, and it is coveted by a lot of others," said Jim Bodine, a vice president at Lockheed Martin and chairman of the Florida Aviation/Aerospace Alliance. "They'd like to move the Space Coast. We're going to decide the competitions largely in the cost margins." Bodine was sounding the same alarm bells that others have: Even with Brevard's rich history of aerospace, there is no guarantee the industry won't pack up and leave it it becomes cheaper and easier to do business elsewhere. "We're going to have to make these companies more competitive," Bodine said. "We're going to have to help them reduce their burden rate." [Florida Today, September 20, 1997, p 14C & 13C.]

September 21:

HE'S GOT NO FEAR OF MIR

David Wolf was an astronaut who wasn't flying. Since his rookie flight in 1993, he had watched friends go into space, once, sometimes twice. Wolf had the taint of scandal on him. He had a prominent role in a 1993 FBI sting of NASA. He accepted a limo ride, a gourmet dinner and a trip to a topless bar from FBI agents posing as merchants peddling phony equipment to NASA. Wolf was never charged or arrested, but his astronaut career was pretty much grounded. Now it is about to soar again, thanks to something that is almost as tattered as Wolf's career has been: space station Mir. Wolf is about to spend four months on the aging station -- which has had a dangerous fire, countless breakdowns of its life-support equipment and a near-fatal crash. He will ride to Mir on the space shuttle Atlantis, set to launch Thursday (Sept. 25) at 10:34 p.m. Wolf was the only astronaut named in the Operation Lightning Strike sting that resulted in 11 people pleading guilty to federal charges. Wolf -- an inventor, medical doctor and engineer -- is not worried about the mostly daily catastrophes on Mir. [The Orlando Sentinel, September 22, 1997, p A-1 & A-4.]

September 22:

EG&G FLORIDA & JOHNSON CONTROLS

EG&G Florida and Johnson Controls, leading a partnership, together with Lockheed Martin and ITT will bid on the base operations contract to combine Kennedy Space Center and USAF's 45th Space Wing. [Florida Today, September 22, 1997, 5A.]

MIR'S COMPUTER CRASHES AGAIN

The Mir's central computer went down again today and a mysterious brown cloud appeared outside the Russian space station, just days before the U.S. space shuttle is to deliver new computer equipment to the aging orbiter. The two Russians and one American aboard Mir were not in any danger, space officials said. But Mir's long list of woes keeps growing. The carbon dioxide removal system failed and a brown cloud appeared outside the station -- a possible indication of a fuel leak. Neither problem appeared serious, deputy Mission Control chief Viktor Blagov said. For the third time in three weeks and the fifth time since July, Mir's computer malfunctioned, shutting down shortly before dawn. The crew replaced a faulty computer block and started tests needed to prepare it for operation. A new computer and a back-up unit are to be delivered to the U.S. space shuttle Atlantis and on the Russian cargo ship Progress, but the Americans want the computer working for the dockings. The Russians do not want to postpone Thursday's shuttle launch because of the latest breakdown, but Blagov acknowledged that it is "difficult to forecast how the computer will behave in the future." At Cape Canaveral, the countdown for Thursday's launch was to begin this afternoon as planned. A new computer for Mir arrived at Cape Canaveral from Moscow this morning, and is to be loaded onto Atlantis on Wednesday. Vladimir Isachenkov. (1997). The Washington Post [Online]. Available WWW: www.washingtonpost.com/wp-srv/inatl/longterm/mir/mir.htm [1997, September 22].]

KSC AWARDS CONTRACT FOR ENGINEERING DEVELOPMENT SUPPORT

KSC awarded a contract valued at over \$160 million to Dynacs Engineering Company, Inc. of Clearwater, FL, to provide engineering support to KSC's Engineering Development organization. The contractor will provide high technology and research services as well as engineering design and technician support. A variety of KSC laboratories will be operated and maintained by Dynacs technicians and their engineers will manage complex research and technology projects. Dynacs will also assist in the transfer of NASA technology to the private sector as part of KSC's Technology Transfer and Commercialization Program. "This year NASA named Dynacs Small Disadvantaged Business contractor of the year and we look forward to a very positive relationship here at Kennedy Space Center," said KSC Director Roy Bridges. The cost plus award fee contract begins Oct. 1, 1997 and, including the four one-year options to extend, potentially continues through Sept. 30, 2002. Dynacs is classified by the Small Business Administration as a small disadvantaged business. The incumbent engineering support contractor is I-Net, Inc., of Bethesda, MD. I-Net is now classified as a large business and was ineligible for the competition. A total of 13 companies

competed for the contract. [KSC Countdown, September 25, 1997.]

September 23: MIR GLITCHES MIGHT KEEP ATLANTIS AWAY

NASA managers today should decide whether the latest computer breakdown on Mir will delay another trip to the crippled outpost by space shuttle Atlantis. Meanwhile, a member of a special panel set up to look over NASA's shoulder on safety issues said Monday that he is worried about general deterioration on the Russian space station. Atlantis is supposed to launch at 10:34 p.m. Thursday (Sept. 25) and deliver a new computer to Mir. Mir's computer failure, the third in three weeks, occurred Monday. NASA officials expect it to be fixed today and do not anticipate having to delay Atlantis' launch. However, the shuttle cannot dock with Mir on Saturday unless the computer is working because it keeps the station from drifting out of proper position. Still, the countdown to Atlantis' launch started Monday, hours after Mir's new computer arrived at Kennedy Space Center. The new computer, a 59-pound device about the size of a microwave oven, arrived from Europe during the weekend as a last-minute addition to Atlantis' cargo list. [The Orlando Sentinel, September 23, 1997, p A-1 & A-4.]

NASA BOSS TO DECIDE IF WOLF FLIES TO MIR

Under increasing political pressure to stop sending Americans to the Mir space station, NASA officials today will reconsider leaving astronaut Dave Wolf on the outpost for four months. NASA administrator Dan Goldin will get new safety reports today on the beleaguered station from two independent experts while the countdown continues to Thursday night's launch of shuttle Atlantis to Mir. Under intense pressure from Congress and NASA's own inspector general, and in a break from standard NASA practice, Goldin himself will make the final call on whether astronaut Dave Wolf will move into Mir. A decision might not be made until launch day, so Goldin -- who has been traveling in Russia with Vice President Al Gore -- has time to weigh the information. One of the reports is from retired Air Force Gen. Thomas Stafford, a veteran of the Gemini and Apollo programs. Stafford commanded the first link-up of U.S. and Russian spacecraft in the 1975 Apollo-Soyuz project. [Florida Today, September 24, 1997, p 1A & 2A.]

**September 25: PANELS GIVE ASTRONAUT A "GO"
FOR LAUNCH TO MIR**

NASA has received concurrence from the final panels reviewing the safety of the Russian Mir space station to proceed with its plans to exchange U.S. astronauts on the orbiting outpost. An independent task force, chaired by Lt. Gen. Thomas P. Stafford, USAF (Ret.), a former Gemini and Apollo astronaut, has reaffirmed NASA's internal reviews to proceed with the Sept. 25 Space Shuttle mission to replace Dr. Michael Foale with Dr. David Wolf on Mir. "This careful and thorough review of the Shuttle-

Mir mission analyzed risk, readiness and, foremost, safety," said NASA Administrator Daniel S. Goldin. "We move forward not only because it is safe, but for the important scientific and human experience we can gain only from Mir. As we prepare for the June 1998 launch of the first element of the International Space Station, nothing can beat the hands-on, real-time training aboard Mir." NASA also asked Mr. A. Thomas Young to conduct an additional external assessment. Mr. Young is a member of the National Academy of Engineering and recently retired Executive Vice President of Lockheed Martin and President and Chief Operating Officer of Martin Marietta Corp. Mr. Young's assessment also endorsed the safety process. [NASA News Release #97-214, September 25, 1997.]

UP AND AWAY -- ATLANTIS IS MIR-BOUND

After a flawless launch, space shuttle Atlantis and astronaut Dave Wolf are now in orbit closing in on Mir, the Russian space station that has been anything but flawless. If the rickety station can keep its balky main computer from failing, the two ships will connect Saturday evening. As lightning flashed in the sky 60 miles away, Atlantis sliced through the night in a 10:34 p.m. liftoff Thursday after a computer software problem on the ground delayed fueling of the shuttle nearly two hours. The launch was made possible when NASA Administrator Dan Goldin decided Thursday morning that Mir was safe enough for Wolf, 41, to live there for the next four months. Wolf will replace Michael Foale, who has been on Mir since May. For the shuttle to dock with Mir, the station has to remain stable in its orbit. Mir's main computer normally handles that task, but it has failed three times in the past three weeks. When the computer fails, Mir slowly drifts. Atlantis can dock with Mir if a failure occurs when the shuttle is no more than 30 feet away. The drift is so slow it would not affect the docking in that amount of time. If the computer fails when the shuttle is farther away, Atlantis commander Jim Wetherbee will have to stop and wait for instructions from Mission Control. Atlantis is carrying a new computer that should solve Mir's ongoing problems. The shuttle also will deliver 5,367 pounds of water and supplies, including a cover for the base of a damaged solar power panel. [The Orlando Sentinel, September 26, 1997, p A-1 & A-4.]

COPS: WOMAN STALKING EX-ASTRONAUT

A Connecticut woman who stalked TV star David Letterman for five years was arrested Thursday after showing up at the Osceola County home of retired NASA astronaut Story Musgrave. Margaret Mary Ray was charged with stalking, a misdemeanor punishable by up to one year in jail. [Florida Today, September 26, 1997, p 1A.]

September 26:

CLCS REDSTONE HARDWARE ARRIVES ON SCHEDULE

The second Checkout and Launch Control System (CLCS) "shipment" is up and running in the Launch Control Center (LCC). Called Redstone, the Sept. 26 hardware "delivery" is actually four prototype consoles set up in the bubble area of Firing Room 2. Each console is configured differently to allow members of the user community to determine which features they like best. Different software products also are featured. CLCS, the next generation processing and launch system, is already yielding concrete benefits. The ice team that goes to the pad after the external tank is loaded, now uses a graphical display developed for CLCS. The display features color graphics of temperature variations on the tank, allowing the ice team to determine quickly and easily where ice formation would be most likely to occur. Over the next six months, the CLCS development team hopes will pin down the final console configuration, which could be a combination of features from the four options. [KSC Countdown, October 2, 1997.]

September 27: CASSINI PROBE REPAIRED, SET FOR SATURN TRIP

NASA's Cassini spacecraft is back on top of the rocket that is scheduled to carry it into space in October to begin its long journey to study Saturn. The space agency made some repairs to the probe earlier this month after a small tear was discovered in the insulation needed to protect the spacecraft on its seven-year flight. NASA officials say they are ready to launch the Titan rocket with Cassini between 4:55 and 7:15 a.m. on Oct. 13. Named for a 17-century Italian astronomer, Cassini is to arrive at Saturn in 2004 and conduct a four-year tour of its icy rings and mysterious moons, while also studying the gaseous planet itself. Scientists around the world say the mission is an unprecedented opportunity to learn more about the evolution of the solar system and with it, Earth's place in the cosmos. [Florida Today, September 28, 1997, p 1E.]

MIR GETS GIFTS, NEW RESIDENT

Atlantis arrived with a computer, drinking water and astronaut Dave Wolf, who will stay on the station for four months. As the door opened to Mir, Atlantis commander Jim Wetherbee shook hands with Mir commander Anatoly Solovyev using his right hand. With his left hand Wetherbee grasped a present, a much-needed one. "That is the computer, yeah?" asked Solovyev with a laugh. It was. The station's main computer -- needed to keep Mir stable in space for maneuvers such as Saturday's 3:58 p.m. docking -- broke down three times in three weeks. The new computer, which is 12 years old, was a late addition to Atlantis. "There's supposed to be some more presents, too," Wetherbee said, laughing as a bag of drinking water floated into Mir. The 11.5-year-old Mir had less than a 30-day supply of water -- a violation of shuttle-Mir safety rules. Over the next five days, Atlantis will deliver 1,500 pounds of water to Mir. Astronaut Dave Wolf is scheduled to live on the crippled space station for four months, replacing Michael Foale. The two ships docked so late -- in Mir time -- that NASA decided that Wolf won't replace Foale until 11:49 a.m. tomorrow. Foale, who has a second longest flight for a U.S. astronaut, will then move into Atlantis. He

has been on mir since May 18 and will come home with the shuttle on Oct. 5. [The Orlando Sentinel, September 28, 1997, p A-8.]

SPACE BECKONS JOHN GLENN TM READY TO GO'

In his cavernous office in Washington, U.S. Sen. John Glenn likes to fiddle with his desktop computer. Most of the time, he browses NASA's site on the Internet, clicking the cursor toward the dates of upcoming shuttle launches. He imagines the one that could return him to space. Through his prodding, NASA has begun entertaining the notion of re-flying one of its most famous astronauts. Glenn, who is 76, last flew in space 35 years ago. Another federal agency has come up with a rationale for the trip - to study how space travel affects the elderly. Even President Clinton supports the idea. Some scientists believe only astronauts should be aboard the spaceship. [Florida Today, September 28, 1997, p 1A & 10A.]

September 27: WOLF MAKES HIMSELF AT HOME ON MIR

Astronaut Dave Wolf claimed a room on the outpost Sunday while the crews of shuttle Atlantis and Mir lugged water, science equipment and materials onto the station that will be the new arrival's home until January. With dazzling views in every direction and a slowly spinning Earth below, a content Wolf said he was in the four-star equivalent of a space station suite. The physician-engineer arrived at Mir on Saturday aboard shuttle Atlantis, which is to remain docked at the outpost until Friday while more than two tons of supplies are unloaded. The docking also allowed Wolf's predecessor on Mir, astronaut Mike Foale, to relinquish his post and join the shuttle crew that will return him to Florida on Oct. 5. The British-born astrophysicist has been in orbit since mid-May. Foale and Wolf are the fifth and sixth Americans to live aboard Mir as part of NASA's plan to gain experience for running the future international space station. [Florida Today, September 28, 1997, p 1A.]

September 28: LEWIS SATELLITE REENTERS OVER SOUTH ATLANTIC

NASA's Lewis Earth-sensing satellite apparently reentered the atmosphere Sunday and was lost over the South Atlantic, U.S. Space Command reported. Space trackers said the satellite, launched last month in the first successful flight of the Lockheed Martin Launch Vehicle, was confirmed down when it did not appear in three subsequent orbital tracks. Built by TRW as an early example of the faster-better-cheaper approach to spacecraft development, the Lewis satellite went into an uncontrolled spin four days after launch and was never recontacted. [Aerospace Daily, September 30, 1997, p 7.]

September 30: RUSSIA CHANGES MIR CRASH STORIES

Russian officials appeared to back away Tuesday from an earlier finding that human error caused an overloaded, unmanned cargo ship to crash into the Mir space station -- the worst-ever collision in space. In a final report on the June 25 crash, officials said it was caused by "an unfavorable combination of factors." Only a short summary of the report was made public, however. Preliminary reports pointedly blamed the crew and ground controllers. But the summary released Tuesday did not mention human error and suggested that some questions about the crash might never be answered. The final government report based on a review by an independent team of American and Russian experts. The panel, headed by former U.S. astronaut Thomas Stafford and Vladimir Utkin, a member of the Russian Academy of Sciences, said mistakes were made by both the crew and ground controllers. [The Orlando Sentinel, October 1, 1997, p A-12.]

ROCKET DEAL LOST

Brevard County's bid to land Boeing Co.'s Delta 4 rocket plant came to a bitter end Tuesday when the aerospace giant announced it had selected a site in Decatur, Ala., instead. Brevard, which had been one of four finalists for the rocket plant, lost out on a facility that would have employed as many as 3,000 people and dramatically boosted the region's economy. Boeing officials did say, though, that the company will construct a \$250 million launch facility at Cape Canaveral Air Station for the rockets, creating more than 900 jobs. [Florida Today, October 1, 1997, p 1A & 5A.]

During September:

ATM NETWORK WILL LET SPACE COMMAND TRACK ROCKETS

The Air Force Space Command is building its first asynchronous transfer mode network to track rockets it launches at Cape Canaveral, Fla. The ATM network is part of the Range Standardization and Automation (RSA) program that will update 30-year-old technology used in Air Force space missions. The multiphase RSA program will boost launch range capacity in anticipation of NASA's development of the Experimental Expendable Launch Vehicle, Space Command officials said. ATM bandwidth can handle the large amounts of telemetry data generated as rockets and payloads shoot into orbit. Each launch vehicle and each payload has different requirements. Reconfiguring the networks after a launch can take as long as several days and creates a high risk of launch-delaying failures. NASA's new expendable vehicle likely will increase traffic early in the next century. [Government Computer News, September 8, 1997, p 108.]

OCTOBER

October 1: CONTROL BOARD REPORTS INTERNATIONAL SPACE STATION LAUNCH ON TARGET, FINALIZES ASSEMBLY SEQUENCE

With the first launch nine months away, representatives of the 15 nations building the International Space Station gathered in Houston this week to finalize the station's assembly sequence and confirm that construction remains on target. The first station element, the U.S.-funded, Russian-built Functional Cargo Block, is on track for a launch in June 1998 from Baikonur. The first U.S.-built station element, Node 1, was shipped from its Alabama factory to the Kennedy Space Center in June to begin preparations for launch on the first Space Shuttle assembly mission, STS-88, set for July 1998. The second of two conical-shaped pressurized mating adapters that will be attached to either end of the node is being shipped from its California factory to Kennedy this week. During the next nine months leading to the start of the International Space Station's five-year, 45-flight orbital assembly sequence, the first truss structure, a third mating adapter and the first solar arrays, batteries and radiators for the station will be shipped from factories nationwide to Florida to be readied for launches in early 1999. Less than a year from now, in August 1998, the first station laboratory, the U.S. Laboratory Module, will be shipped from a Huntsville, AL, factory to Kennedy to begin final testing and launch preparations. [NASA News Release #97-222, October 1, 1997.]

NASA DEFENDS CASH SHUFFLES

A top NASA official Wednesday faced down angry lawmakers and said he will keep drawing money from the space shuttle budget, if necessary, to keep the cash-strapped space station program on track. The money transferred from the shuttle comes from a contingency fund that is carried over from year to year. The fund now has a balance of about \$400 million, according to the General Accounting Office. A GAO official who testified Wednesday supported NASA space flight chief Wilbur Trafton contention that the cash transfers so far have not affected spending on shuttle safety and upgrades. Besides Russian delays, the space station program is plagued by \$610 million in projected cost overruns at Boeing Co., the prime U.S. contractor. NASA is scrambling to avoid further delays that would push launch of the station's first part beyond June. [The Orlando Sentinel, October 2, 1997, p A-8.]

SPACEWALK THE THRILL OF A LIFETIME

An American-Russian spacewalking team delivered a specially designed hole-plugger to the battered space station Mir on Wednesday as cosmonauts inside the outpost replaced a crucial but balky computer. The five-hour foray marked the first U.S.-Russian spacewalk from an American shuttle, setting the stage for the joint construction of a \$40 billion international space station that will replace the

increasingly decrepit Mir. [Florida Today, October 2, 1997, p 1A & 6A.]

CEREMONY TO HONOR ASTRONAUTS

Thirty of America's space heroes -- astronauts from the Mercury, Gemini and Apollo eras -- are gathering in Titusville Saturday (Oct. 4) for a ceremony to induct 24 Apollo astronauts into the U.S. Astronaut Hall of Fame. Walter Cronkite, longtime CBS news anchor who reported on early space history, including man's landing on the moon, will serve as master of ceremonies. Among the 24 inductees, all 18 astronauts who are living are expected to attend the ceremony. They include: Astronauts who first flew in space on Apollo missions: Fred W. Haise Jr., Thomas K. Mattingly II, William A. Anders, Edgar D. Mitchell, Alfred M. Worden, Russell L. Schweickart, Harrison H. Schmitt, Charles M. Duke Jr., Alan L. Bean and Walter Cunningham. Astronauts who first flew on the Apollo-Soyuz project or on Skylab: Vance D. Brand, Gerald P. Carr, Owen K. Garriott, Edward G. Gibson, William R. Pogue, Dr. Joseph P. Kerwin, Jack R. Lousma and Paul J. Weitz. The following Apollo astronauts are being inducted into the Hall of Fame posthumously: Roger B. Chaffee, Stuart A. Roosa, Donn F. Eisele, Ronald E. Evans, James B. Irwin and John L. Swigert Jr. Chaffee is the only inductee who died in the line of duty. In addition to the inductees, 12 astronauts who already are in the Hall of Fame as inductees under the Mercury and Gemini projects are expected to attend: Alan Shepherd, John Glenn, Wally Schirra, Buzz Aldrin, Jim Lovell, Pete Conrad, Gene Cernan, Dick Gordon, Gordon Cooper, Jim McDivitt, John Young and Scott Carpenter. The U.S. Astronaut Hall of Fame and U.S. Space Camp exist on a single campus and are the cooperative effort of two nonprofit foundations: the Astronaut Scholarship Foundation, established in 1984 by the Mercury astronauts, and the U.S. Space Camp Foundation. [Florida Today, October 2, 1997, p 1B & 2B.]

October 2:

POLICE READY FOR CASSINI PROTESTERS

The protesters are ready, and so are the police. Saturday's Cassini protest rally will draw both in large numbers. Up to 150 people are expected to scale the Cape Canaveral Air Station's fence and ground themselves on restricted federal property, then wait patiently for Brevard County Sheriff's deputies to arrest them. The 1987 march against the Trident 2 nuclear missile program resulted in 138 of the 5,000 protesters being arrested. [Florida Today, October 3, 1997, 6A.]

PATHFINDER TEAM PLANS NEW COMMUNICATIONS EFFORTS WITH SPACECRAFT

The Mars Pathfinder is still operating, but NASA is struggling to find ways to communicate with the spaceship that has now outlived its original minimum design life by nearly two months. After three days of problems communicating with the spacecraft, controllers were able to reestablish enough contact with the lander through an auxiliary transmitter to determine it's still operational, NASA officials say. The

brief communication session Tuesday night marked the first time the Pathfinder's engineers and scientists heard from the spacecraft since downloading data in a session that ended early Saturday, the 83rd day of the mission. [Florida Today, October 3, 1997, p 6A.]

FINAL ENVIRONMENTAL IMPACT STATEMENT RELEASED

NASA has released the Final Environmental Impact Statement on the development and flight testing of the X-33 Advanced Technology Demonstrator. Per the report, the X-33's preferred launch site is located at Edwards Air Force Base, CA, and the three preferred landing sites identified are a dry lake bed near Baker, CA, Michael Army Air Field, Dugway Proving Ground, UT, and Malmstrom Air Force Base near Great Falls, MT. NASA will issue the final Record of Decision on the report within the next 30 days. [KSC Countdown, October 2, 1997.]

October 3:

CASSINI/HUYGENS SCHEDULED FOR LAUNCH TO SATURN OCT. 13

The launch of NASA's Cassini spacecraft and the European Space Agency's Huygens probe is scheduled for Monday, Oct. 13, at 4:55 a.m. EDT. Liftoff will occur aboard an Air Force Titan IV-B/Centaur rocket from Space Launch Complex 40 on Cape Canaveral Air Station, FL. The launch window extends for 140 minutes until 7:15 a.m. EDT. The primary launch opportunity extends through Nov. 15. [NASA News Release #176-97, October 3, 1997.]

LONG SHOT HITS: ATLANTIS MAY HAVE FOUND MIR'S LEAK

Shuttle Atlantis left one parting gift for space station Mir as it pulled away Friday: the probable location of the punctured outpost's mystery leak. As the shuttle circled Mir, hit by an unmanned ship June 25, cosmonauts in the station shot two bursts of air into the dead Spektr lab to see if something would spray out, pinpointing the source of the leak. Looking through video and still cameras, astronauts and cosmonauts saw particles shoot out from the base of Mir's damaged solar panel, which took the brunt of June's crash. It could have been ice inside the cold Spektr lab, forced out by the air. Or it could have been debris, such as insulation or paper, that had been floating inside Spektr, NASA officials said. Whatever it was, it was a welcome sight. The photographic evidence has to be examined, and it's too early to say it's the definite leak. But the finding is "a major step forward," said Charles Vick, a Russian space analyst for the Federation of American Scientists, a Washington think tank. Atlantis, scheduled to land at 6:58 p.m. Sunday, already has left Mir in better shape than it was when the two ships docked a week ago. The shuttle delivered a new main computer shortly after docking and transferred more than 5 tons of equipment to and from Mir, including more than 1,500 gallons of water to boost Mir's dwindling water supply.

October 4:

SOVIET'S FIRST SALVO

Sputnik 1, the first artificial satellite was successfully launched 40 years ago today by the then Soviet Union, an event which signaled the beginning of the "space race." The satellite was an aluminum sphere, 23 inches in diameter weighing 184 pounds with four steel antennae emitting radio signals. Sputnik was launched on Oct. 4, 1957 and stayed in orbit 92 days until Jan. 4, 1958. [Florida Today, October 4, 1997, p 1D.]

PROTESTERS SET TO GO

While anti-Cassini protesters made preparations for today's rally at the entrance to Cape Canaveral Air Station, President Clinton gave final approval Friday (Oct. 3) to the space probe's Oct. 13 launch. The decision marked the last political hurdle for the \$3.3 billion mission. Cassini will carry 72 pounds of radioactive plutonium to generate electricity for its science instruments during its four-year study of Saturn and the planet's rings and moons. Opponents, however, were not daunted by the approval -- which was granted by President Clinton's science adviser, John H. Gibbons. As with all launches involving plutonium, the White House has final authority. Activities planning to attend today's protests started arriving Friday. Estimates of the crowd's size varied wildly from a few hundred to more than 10,000. [Florida Today, October 4, 1997, p 1A & 2A.]

27 ARRESTED AT PROTEST OF CASSINI

Facing certain arrest, 27 protesters crossed the chain-link security gate at Cape Canaveral Air Station on Saturday to dramatize their opposition to next week's launch of plutonium-powered Cassini Saturn probe. All, including a group of nine calling itself Grandmothers for peace, were taken into custody as about 800 others who marched to the gate cheered and chanted. It was a tightly choreographed demonstration. The marchers, many waving signs, marched nearly a mile down sweltering State Road 401, following a kilted bagpiper and several women carrying poles decorated with white origami doves. Behind the gate, a long, thin line of Brevard County deputy sheriffs waited in riot helmets. It turned out they were overly prepared. "It was outright friendly out there," said Sheriff's Office spokeswoman Joan Heller. "Everybody went along peacefully and without resistance." The Grandmothers contingent was the first in, led by 87-year-old Peggy McIntire. The deputies opened the gates and escorted the women into custody as the placard-waving crowd chanted, "Go Grandmothers." The next wave scaled the barricade with a ladder. One after another, they waved, flashed peace signs, raised fists and paused to give short speeches before dropping over into the arms of deputies. The demonstration and its carefully orchestrated acts of civil disobedience were the final event in a series of protests since March outside the base, where Cassini is to be launched Oct. 13 aboard

a Titan rocket. Only three local activists were arrested Willa Elam, Palm Bay; Leslie Telesca, Satellite Beach; and Theresa Beasley, Rockledge. [The Orlando Sentinel, October 5, 1997, p B-1 & B-7. Florida Today, October 5, 1997, p 1A & 11A.]

October 5:

CLOUDS KEEP ATLANTIS WAITING

Michael Foale's long-desired return to Earth aboard the space shuttle Atlantis has been delayed a day because the sky over Kennedy Space Center were too cloudy. Only a quarter of the sky was clear. NASA officials had planned to land Atlantis just before sunset, but the clouds were sticking around. Meteorologists thought the clouds would move away in time to try landing at 8:36 p.m. But the clouds didn't budge. Atlantis has two landing opportunities at KSC tomorrow, at 5:55 p.m. and 7:31 p.m. But unlike today, NASA will have a team ready for Atlantis at Edwards Air Force Base in California. [The Orlando Sentinel, October 6, 1997, p A-5.]

ROCKET LAUNCH TAKES CENTER STAGE

In what originally was billed as the undercard to Sunday's landing of space shuttle Atlantis, a Lockheed Martin Atlas 2AS rocket launched into orbit a telecommunications satellite from Cape Canaveral Air Station. The Atlantis flew right on time at 5:01 p.m. from Complex 36B and deployed the EchoStar 3 satellite about 30 minutes after launch. The 8,100-pound satellite will orbit about 22,300 miles above Earth. The launch was the sixth of nine planned Atlas missions from the Cape this year. The possibility of a space coast first -- a 10 minute gap between the shuttle landing and Atlas launch -- was erased with Atlas launch managers decided to do away with the later launch time. [Florida Today, October 6, 1997, p 1A.]

October 6:

FOALE RETURNS TO EARTH

Space shuttle Atlantis landed at Kennedy Space Center Monday evening, returning its original crew of seven and U.S. astronaut Michael Foale to Earth after a tumultuous four-and-a-half months aboard Mir. Foale was reunited with his wife Rhonda and his two children two hours after landing, and received a phone call from NASA Administrator Daniel Goldin, who congratulated him on a "wonderful job." The spaceship and its crew cruised to a 225 mph touchdown at 5:55 p.m. capping an 11-day mission. A British-born astrophysicist, Foale spent 145 days in space. On the 11-year-old Mir station, he survived a June 25 cargo ship crash, along with repeated power outages, computer crashes and temporary shutdowns of life-support systems. Foale's mission was the second-longest U.S. spaceflight ever. Astronaut Shannon Lucid was in space for 188 days during a trip to Mir in 1996. The Atlantis mission was the seventh of nine planned shuttle-Mir dockings, flight aimed at paving the way for the joint U.S.-Russian construction of a new \$40 billion international space station. Foale's replacement on Mir is the sixth of seven astronauts who will be carrying out research tours on Mir as part of the \$472 million program. Wolf, a 41-year-old

physician, was launched to Mir despite objections from several congressmen who say the increasingly decrepit Mir is unsafe. During the six days Atlantis was docked at Mir, a record 10,440 pounds of cargo was hauled between the two craft as they circled 250 miles above Earth at 17,500 mph. [Terence Nelan. (1997). ABC News [Online]. Available WWW: www.abcnews.com/sections/scitech/mir106/index.html [1997, September 22]. Florida Today, October 7, 1997, p 1A & 2A.]

AIR FORCE REMAINS ON SECURITY ALERT

Air Force installations in Brevard County will remain on a heightened security alert this week until NASA's Cassini probe is launched, even though protests against the mission have ended. The lowest level alert - Threat-com Alpha - remains in effect because of a "perceived threat to facilities and personnel" from anti-Cassini activists, said Ken Warren, spokesman for 45th Space Wing at Patrick Air Force Base. The plutonium-fueled Cassini spacecraft is set for liftoff at 4:55 a.m. Monday from Cape Canaveral Air Station atop a Titan rocket, embarking on a 11-year journey to study Saturn. [Florida Today, October 7, 1997, p 1B.]

October 7:

MIR READIES FOR ANOTHER CARGO SHIP

A day later than planned, the Mir space station jettisoned a garbage-laden supply ship Tuesday, making way for the arrival of a vessel hauling a back-up computer and fuel. The progress M-35 cargo ship left the station after the crew repaired a clamp that had been preventing the maneuver, said Vera Medvedkova, a spokeswoman for Russian Mission Control. The discarded ship, carrying trash from the station, will burn up as it re-enters the Earth's atmosphere. [Florida Today, October 8, 1997, p 2A.]

HUBBLE DETECTS MOST POWERFUL STAR EVER

The Hubble Space Telescope has captured a glimpse of what is believed to be the most powerful star ever detected - a colossus that pumps out 10 million times more energy than the sun and yet can't be seen with the naked eye. [The Orlando Sentinel, October 8, 1997, p A-6.]

October 8:

COCKRELL NAMED CHIEF ASTRONAUT

Three-time shuttle veteran Kenneth D. Cockrell has assumed the role of Chief of the Astronaut office, replacing Robert D. Cabana (Col., USMC). Cabana, who served as Chief Astronaut since mid-1994, is training for shuttle mission STS-88, the first United States assembly flight to build the International Space Station. STS-88 is scheduled for a July 1998 launch. [NASA News Release #97-230, October 8, 1997.]

PATRICK OVERHAUL POSSIBLE

The way the military conducts launch business on the Space Coast could change radically under a plan being considered by senior Air Force officials. Written by the commander of the 45th Space Wing, the plan calls for Patrick Air Force Base - the current wing headquarters - to be converted into an Air Force Reserve Command base. The plan would move the space wing to Cape Canaveral Air Station and significantly reduce Patrick's longstanding lead role in the military launch business. It also calls for military launch support work to be handed over to either Air Force reservists or private companies, much in the same way that NASA has been turning over operations of its space shuttle fleet to contractors. The plan reflects a cash-strapped Air Force struggling to redefine its space launch role in an era of declining budgets. [**Florida Today**, October 9, 1997, p 1A & 2A.]

HOUSE VOTES TO GIVE NASA \$13.6 BILLION

The House voted Wednesday to give NASA \$13.6 billion for the fiscal year already under way, breaking a spending cap on the international space station but denying the space agency the authority to shift even more money to the planned outpost. The money was included in the final version of a \$90.7 billion annual spending bill for the Department of Veterans Affairs, Housing and Urban Development and 17 independent agencies. The bill passed by a vote of 405 to 21. NASA's allocation is approximately \$100 million below the 1997 fiscal year's appropriation and marks the fourth year in a row its overall budget has declined. Crafted by House and Senate appropriators, the bill allows NASA to spend a little more than \$2.3 billion on the international space station, breaking the \$2.1 billion annual cap Congress had set for the project. The additional \$230 million for the station came from several sources: shifting \$50 million from the shuttle account, \$80 million from mission support and then simply adding \$100 million not previously approved. With the first piece of station hardware - built in Russia under a NASA contract with Boeing - scheduled for launch next June, 1998 is a pivotal year for the station. [**Florida Today**, October 9, 1997, p 10A.]

CARGO SHIP LINKS WITH MIR STATION

A Russian cargo ship ferrying crucial supplies achieved a problem-free docking with Mir on Wednesday, bolstering Russian Mission Control as it tries to put the space station's troubles behind it. The unmanned Progress M-36, carrying a back-up computer, docked on automatic pilot a few minutes ahead of schedule. Shuttle Atlantis, which left Mir last week, delivered a new computer and other important equipment, including a sealant for holes punched when a cargo ship slammed into Mir's Spektr module during a practice docking in June. Atlantis also brought up U.S. astronaut David Wolf, who will spend four months on Mir. [**Florida Today**, October 9, 1997, p 10A.]

PATHFINDER FINDS EVIDENCE MARS MAY HAVE BEEN HOSPITABLE TO LIFE

The Mars Pathfinder has yielded what scientists said Wednesday is the strongest evidence yet that Mars, like Earth, has a crust, a mantle and an iron core - lending support to the theory that the Red Planet might once have been hospitable to life. The evidence that the planet is not merely a solid ball of rock came from analyzing radio signals from Pathfinder as Mars spins on its axis. Having enough heat to create these distinct layers gives weight to the theory that Mars once may have been warm and wet enough for life to evolve, as it did on Earth. Mars formed 4 billion years ago.

[**Florida Today**, October 9, 1997, p 10A.]

ASTRONAUT'S NAME ADDED TO MIRROR

Astronaut Robert Lawrence's name was put up on the space mirror at the Astronauts Memorial at Kennedy Space Center's Visitors Center on Wednesday morning. [**Florida Today**, October 10, 1997, p 1B.]

October 9:

NASA WAITS FOR RAINY DAY TO TRY EXPERIMENTAL ROCKET

The National Aeronautics and Space Administration's reusable rocket, the X-34, will get its initial test flights in New Mexico next year. Then the rocket will fly about 10 times at Kennedy Space Center starting in July 1999. The rocket is carried into the air by an L-1011 jet. Then it is dropped, where it fires and flies on its own. Unlike all other unmanned rockets, the X-34 will return to its launch site and land autonomously like an airplane with wings and wheels. The main reason this rocket is coming to Florida is "adverse weather," said NASA X-34 project manager Jack Levine. The New Mexico tests will make sure the rocket works. But NASA wants to fly the rocket in rain, wind and fog. The Sunshine State fits the bill. So KSC officials, who hate bad weather for shuttle launches, will wish for rain to fly X-34. Launches could be scrubbed because of good weather, said Warren Wiley, Kennedy Space Center's future vehicle program manager. X-34 is built by Orbital Sciences Corp. of Virginia for NASA in a \$60 million program that is about to expand. The rocket is 27 feet, 7 inches from wing to wing and 60 feet long. The jet will release the rocket at about 38,000 feet. The rocket will reach a speed of Mach 8, travel almost 700 miles over the Atlantic Ocean and return in 15 minutes. Because it's an experimental rocket, it won't go into space or carry cargo. Its maximum altitude is about 50 miles. X-34 is what space experts call a single-stage-to-orbit rocket, which means no boosters or external tanks fall off. Those type rockets don't need coastal launch pads, such as KSC. KSC officials said they realized they had to attract this type of rocket to Kennedy, by touting existing facilities, or lose some of the space business in the future. "The shuttle probably is going to phase out," KSC's Wiley said. "So it's important for us to get in on the new vehicles...We still think KSC-Cape Canaveral,

Florida, is the gateway to the universe, and we want to see it stay that way." [The Orlando Sentinel, October 10, 1997, p A-4.]

ANTI-CASSINI GROUP PLANS TWO MORE RALLIES BEFORE LIFTOFF

Anti-Cassini activists plan two more mini-protests near the gates of the Cape Canaveral Air Station as the clock ticks down to the launch of the plutonium-powered space probe. Anti-Cassini picketers have been at the gates of the air station each day this week after 800 activists rallied last Saturday. Of those, 27 were arrested for illegally entering the base. On Thursday, protesters also rallied at the Jet Propulsion Laboratory in Pasadena, Calif. Anti-Cassini activists are concerned that a launch disaster could expose millions of people to dangerous radioactive material. [Florida Today, October 10, 1997, p 5A.]

October 10:

THOMAS WILL CONTINUE AMERICAN PRESENCE ON MIR

Astronaut Andrew S. W. Thomas, Ph.D., has been named as the final U.S. crew member to live and work aboard Russia's Mir space station. Thomas will launch aboard Endeavour as a member of the STS-89 crew in January 1998 to begin a four month stay on Mir. He has been training in Russia since January of this year as the backup to Dr. David Wolf, who began his tour aboard Mir on September 28. Thomas' scheduled departure from Mir next May will conclude more than two years of continuous American presence on Mir, which began in March 1996 with the arrival of astronaut Shannon Lucid. Thomas will come home aboard Discovery with the crew of STS-91 in May 1998. [NASA News Release #97-231, October 10, 1997.]

October 11:

TITAN IV/CASSINI-HUYGENS STATUS REPORT

The launch of NASA's Cassini spacecraft aboard an Air Force Titan IV rocket from Complex 40 remains on schedule for 4:55 a.m. on Monday, Oct. 13. [Titan IV/Cassini-Huygens Status Report, October 11, 1997.]

October 12:

NASA LOOKS AT LIFE AFTER THE SHUTTLE

While its vintage shuttle fleet continues to perform nearly flawlessly, NASA is facing difficult choices as it looks to the next century. Should the workhorse spaceplane continue receiving periodic upgrades to keep its 1970s technology in orbit beyond 2013? Or should the agency put its boosters in another basket? That is, build a spacecraft that can carry humans to space faster and cheaper but with one important caveat - no one knows yet if it can be built. At the direction of the White House Office of Management and Budget, NASA has prepared a comprehensive space transportation strategy that attempts to define the future of access to space without

committing to it. Most visible among the future-looking projects are those designed to test whether an efficient, practical and reusable launch vehicle can be developed. Leading the crop now is the X-33 Advanced Technology Demonstrator being built by Lockheed Martin in partnership with NASA. The sub-scale, pilotless, suborbital model will take off vertically and land horizontally. The X-33 won't feature costly, throwaway external booster rockets and can be turned around for reuse in a matter of days, not several months like the shuttle. Other vehicles designed to demonstrate various aspects of advanced space transportation also are in the works through different NASA contracts. Once the space transportation strategy is released, it will assuredly attract close congressional scrutiny. [Florida Today, October 13, 1997, p 2A.]

October 13: TITAN/CASSINI-HUYGENS STATUS REPORT

The launch of NASA's Cassini spacecraft aboard an Air Force Titan IV/Centaur rocket has been postponed until Wednesday, October 15. The primary issue was upper level wind conditions which had the potential of blowing debris outside safe impact limit lines. The recycle involves moving the mobile service tower back into position around the rocket, detanking the Centaur upper stage, and restarting launch processing. [Titan/Cassini-Huygens Status Report, October 13, 1997.]

**October 14: 50 YEARS AGO,
MAN FLEW FASTER THAN SOUND**

On October 14, 1947, 50 years ago Tuesday, Capt. Charles E. Yeager (USAF) at Muroc, Calif., broke the sound barrier in a rocket-powered NACA-USAF research plane, Bell XS-1, later the X-1. [The Orlando Sentinel, October 13, 1997, p A-4. Aeronautics and Astronauts 1915-60, p 58.]

**SHUTTLE LANDING SIMULATIONS TO
IMPROVE WITH SMART SOFTWARE**

To assist future Shuttle pilots, NASA will install new, intelligent software in the training aircraft that simulates the Space Shuttle Orbiter. The new software will make the training aircraft 'feel' more like a Shuttle landing. "Tests of the smart software in simulators on the ground with the Shuttle Training Aircraft hardware are extremely successful, proving that the trainer airplane using new computer coding will seem a lot more like a Shuttle as it comes in and lands. Landing an orbiter for the first time will seem a lot more familiar to astronauts," said Dr. Hamid Berenji, software project manager at NASA's Ames Research Center, Moffett Field, CA. Berenji says the new software is closer to human thinking than previous software, and computers equipped with neuro fuzzy logic can accurately be called rudimentary mechanical brains. [NASA News Release #97-229, October 14, 1997.]

October 15:

COSMONAUT ROUNDS OUT STS-89 CREW

Cosmonaut Salizhan Shakirovich Sharipov, a first-time space flyer, has joined the crew of STS-89, the eighth Shuttle/Mir docking mission. STS-89 is targeted for a January 1998 launch to dock with Russia's Mir space station. Sharipov will be assisting the Mir and Shuttle crews in the transfer of logistical supplies between the two vehicles. [NASA News Release #97-234, October 15, 1997.]

SATURN'S MYSTERIES BECKON CASSINI

The Cassini/Huygens mission to Saturn, the largest, most complex and expensive planetary flight ever undertaken by the U.S. and Europe, is outbound on what promises to be one of the great explorations of the early 21st century. The predawn launch at 4:43 a.m. EDT on board a U.S. Air Force/Lockheed martin Titan 4B/Centaur propelled Cassini at 7 mi./sec. on the initial leg of its seven-year journey. "The accuracy of this launch was the definition of 'phenomenal,'" said Richard J. Spehalski, Cassini program manager. The Earth escape velocity imparted to the spacecraft by the Centaur upper stage was accurate to within one part in 5,000, and the angular deviation from the planned trajectory was less than 0.004 deg. At \$3.3 billion and 12,600 lb., Cassini is the heaviest, most expensive planetary mission ever flown by NASA. The 22 x 13-ft. spacecraft weighs more than the earlier Voyager and Galileo vehicle designs combined. Cassini could also have a project life that spans nearly 30 years, from its conception in 1982. [Aviation Week & Space Technology, October 20, 1997, p 22.]

WORKERS ADMIT CHEATING ON NASA EQUIPMENT TESTS

A research company, five of its executives and a government inspector were indicted Wednesday on charges they falsified critical tests of military and aerospace equipment used by NASA in space shuttles, missile systems and the Hubble Space Telescope. The microelectronic devices tested by Oneida Research Services Inc. were also for use in aircraft, submarines, space shuttle and satellites. The tests were designed to detect excessive moisture, which can cause corrosion in circuitry and lead to malfunctions. The company, one of six labs worldwide involved in such research, had its government testing license permanently revoked in March 1996, said Donald V. McNamara, agent in charge of the Defense Criminal Investigative Service in Syracuse. Because the government's investigation is ongoing, McNamara declined to say whether any of the questionable parts tested by the company were ever used. [Florida Today, October 16, 1997, p 2A.]

October 18:

SPACEPORT IS SEEKING 2ND LAUNCH COMPLEX

In another important move to boost local space commercialization efforts, Spaceport Florida Authority plans to acquire a second launch complex at Cape Canaveral Air Station. The agency is asking the Air Force to let it convert Launch Complex 20 - a

deactivated military facility - into a home for small rockets heading off on orbital and suborbital missions. The site is a few miles north of Launch Complex 46, which Spaceport completed earlier this year. The agency expects to launch its first rocket from that pad Nov. 23. The inaugural flight will be NASA's Lunar Prospector, which will spend a year mapping the moon and looking for signs of water that could be utilized by future lunar colonies. Spaceport's plans call for Complex 20 to have three launch pads, a launch control blockhouse and a facility that will prepare and store small payloads. The new complex will cost about \$2.5 million compared with the \$8 million spent to build Complex 46. "Complex 20 was originally a Titan 2 facility," Al Thomas, technical director at Spaceport Florida Authority said. "It supported both the Air Force and NASA back in the '60s." Abandoned late in that decade, Complex 20 was reactivated during the late 1980s by the Pentagon's Ballistic Missile Defense Office, which used the pad for rail-launched vehicles such as Starbird and Red Tigriss. The agency abandoned the pad 1994. [Florida Today, October 19, 1997, p 1A & 2A.]

October 20:

MIR CREW CONNECTS CABLES

The Mir's two cosmonauts cleared away floating space debris and connected several new cables Monday during an internal spacewalk that should boost power on the damaged space station. The cosmonauts found a roomful of surprises when they entered the darkened and airless Spektr module. "Seven bags are flying around - and a refrigerator door," said Anatoly Solovyov, the most experienced spacewalker in history. The bags, which contained scientific equipment and personal belongings, were taped to the walls and a safe place was found for the door. The cosmonauts then proceeded with their main task - installing cables that will link three solar panels on the Spektr module to a computer on the undamaged Kristall module. The two Russians and American astronaut David Wolf will need another day or two of testing to determine the success of the project. [Florida Today, October 21, 1997, p 2A.]

LASER SHOT NAILS ORBITING SATELLITE

A high-powered Army laser trained its invisible beam on a U.S. satellite, 260 miles above the Earth, as it emerged from over the horizon to the north. The test, conducted Friday (Oct. 17) at White Sands Missile Range, N.M., and announced Monday at the Pentagon, went off successfully, pointing to a possible new direction in warfare. The Pentagon views the test as concrete proof of a long-held concern: that its own satellites, as well as intelligence, civilian or commercial satellites, are vulnerable to laser weapons. [Florida Today, October 21, 1997, p 2A.]

October 21:

COOPER TO RETIRE FROM NASA

Benita A. Cooper, Associate Administrator for Management Systems and Facilities, has announced her retirement from NASA effective Oct. 31, 1997. Cooper was responsible for Agency oversight of facilities and maintenance, logistics, aircraft

management, security, environmental management, information systems, internal controls and audit liaison. [NASA News Release #97-241, October 21, 1997.]

October 22:

HOLCOMB NAMED
NASA CHIEF INFORMATION OFFICER

Lee B. Holcomb has been named Chief Information Officer (CIO) at NASA Headquarters, Washington, DC, effective immediately. Holcomb will succeed Ronald S. West, who retired earlier this year. [NASA News Release #97-243, October 22, 1997.]

LAUNCH OF LUNAR PROSPECTOR
RESCHEDULED FOR EARLY JANUARY

The launch of the Lunar Prospector mission to explore the Moon has been rescheduled for Jan. 5, 1998, NASA officials announced today. The schedule adjustment is necessary to allow adequate time to complete the rigorous testing, review and preparation of the new Lockheed Martin Athena II launch vehicle (formerly known as the LMLV-2). The previous launch date was Nov. 23, 1997. [NASA News Release #97-242, October 22, 1997.]

MISSILE CRISIS 35 YEARS OGO

The Cuban missile crisis came to a head Oct. 22, 1962, when President Kennedy established an air and sea quarantine to prevent Russian nuclear missiles from being delivered to Cuba. Soviet leader Nikita Khrushchev ultimately agreed to dismantle the missile sites. [John Kennedy Jr. in Cuba years after missile crisis, Florida Today, October 25, 1997, p 2A.]

October 24: **SCIENTISTS FEAR IT'S GOODBYE TO MARS FOR NOW**

With a dead battery and subfreezing temperatures, Mars Pathfinder may have sent its last spectacular pictures from the red planet. NASA has been unable to contact the Martian lander and its rover since Oct. 7 and is running out of ways to communicate with the \$196 million probe. It doesn't look like NASA will be able to talk with Pathfinder again, officials said Friday. The longer it takes to contact Pathfinder, the worse the chances are of re-establishing communication. NASA will spend the next two weeks trying new ways of talking to the lander. If nothing works by early November, engineers will have to give up regular attempts at contact, Mars Pathfinder Project Manager Brian Muirhead said in an interview Friday. While Pathfinder's mission appears to be ending, Mars Global Surveyor's mission is threatened just as it is beginning. The \$148 million mapping probe arrived at its egg-shaped orbit of Mars in September and was supposed to dip into the Martian atmosphere to slow itself down and attain the proper orbit by March 1999. But a broken hinge appears to have

interfered with the mission. Two weeks ago, NASA stopped its braking technique because the hinge has become stuck on one of the probe's two solar power panels. When the problem was discovered last year after the launch, NASA said it wasn't serious. But when the probe dipped into the atmosphere this month, the solar panel started to flap dramatically, global surveyor manager Glenn Cunningham said. Officials will decide Monday which of two options to try: Find a way to ease into the atmosphere without damaging the solar panel or forget about that method and get to the best possible orbit. NASA hopes to launch another Martian probe next year. [The Orlando Sentinel, October 25, 1997, p A-1 & A-14.]

ATLAS LIFTS SATELLITE INTO ORBIT

A Lockheed Martin Atlas 2A lifted off from Cape Canaveral Air Station at 8:46 p.m. carrying a military telecommunications satellite. Weather and technical problems delayed the launch by more than an hour. The launch marked the first Air Force flight of the Atlas 2A launch vehicle and the 10th flight of a Defense Satellite Communications System 3 spacecraft. The spacecraft joins nine other DSCS 3 satellites and two DSCS 2 satellites in orbit. [Florida Today, October 25, 1997, p 2A.]

October 28:

MARSHALL CENTER DIRECTOR WAYNE LITTLES ANNOUNCES RETIREMENT

Marshall Center Director Dr. Wayne Littles announced his plans to retire on Jan. 3. No decision has been made as to who will replace him. [KSC Countdown, October 28, 1997.]

MIR ASTRONAUT WILL CAST ABSENTEE BALLOT FROM AFAR

For the first time in history, an American astronaut is about to exercise his right to vote while in orbit. A ballot has been sent to David Wolf aboard the Russian space station Mir, thanks to a new Texas law. Under the old law, an absentee ballot had to be mailed. But in June, Gov. George W. Bush signed a bill saying astronauts registered to vote in Texas - where most of them live - can cast ballots from space. Using new software, a ballot was sent last week to U.S. flight controllers in Moscow, and they transmitted it to Wolf. The 41-year-old doctor and engineer will open the e-mail on a laptop computer. [Florida Today, October 29, 1997, p 1A.]

CONTRACT MEANS 60 NEW JOBS HEADED FOR KSC

About 60 new jobs will be added to Kennedy Space Center's payroll next year when the spaceport takes over the job of purchasing rockets that will launch NASA probes on their missions. The change will consolidate work already done at KSC and two other NASA sites: Goddard Spaceflight Center in Greenbelt, Md., and Lewis

Research Center in Cleveland. By moving the work to KSC, the agency plans to eliminate about 60 jobs at the other centers in an effort to save money, said Karen Poniatowski, director of expendable launch vehicle program at NASA headquarters in Washington, D.C. About 60 KSC employees already work in the program, and another 60 are expected to be added. However, only about 40 of the new workers will relocate to Florida. [Florida Today, October 29, 1997, p 2A.]

'ARMAGEDDON' STARS POP INTO TOWN

Billy Bob Thornton and Bruce Willis are in town for the filming of "Armageddon" at Kennedy Space Center. Set for July 1998 release, "Armageddon" features an asteroid on a collision course with Earth. Willis plays an oil driller who - with help from Thornton - gets astronauted into action against the apocalyptic projectile before it turns the Blue Planet into Mars. Also getting major face-time in this Touchstone Pictures production are actors Will Patton and Liv Tyler. "The Rock" director Michael Bay will be calling the shots at KSC, which has enjoyed a banner year with filmmakers. The Space Center accommodated Jodie Foster's summer hit "Contact," as well as Tom Hanks' series "From The Earth to The Moon" for HBO. [Florida Today, October 29, 1997, p 1D.]

October 30:

KSC ASSUMES LEAD FOR ACQUISITION AND MANAGEMENT OF ELV LAUNCH SERVICES

NASA has assigned KSC lead center responsibility for the agency's acquisition and management of expendable launch vehicle launch services. This assignment will eliminate redundancy in the procurement, management, fiscal and administrative functions of expendable launch vehicles. It also will enable concentration of launch operations expertise at Kennedy. Atlas management will transition to Kennedy from Lewis after the next Atlas mission which is currently planned for June, 1998 from Vandenberg Air Force Base. Delta and Pegasus management will transition from Goddard to Kennedy by FY 1999. Kennedy will also issue and award the launch services contract(s) for the follow-on small expendable launch vehicle contract with support from Goddard and the Marshall Space Flight Center, Huntsville, AL. The Kennedy assignment complements and does not alter NASA's assignment to Marshall for the lead in vehicle engineering and insight for development vehicles which lack a flight history. [KSC Countdown, October 30, 1997.]

KSC EXTENDS CURRENT BASE OPERATIONS CONTRACT

NASA procurement officials plan to exercise an option to extend the performance period of the Kennedy Space Center (KSC), FL, Base Operations Contract (BOC). The action is effective Nov. 1, 1997 through Sept. 30, 1998, with an estimated value of \$147 million. The option's original performance period was for two years through Oct. 31, 1999, but, in order to accommodate the anticipated award of the Joint Base

Operations Support Contract (JBOSC) slated for award by Oct. 1, 1998, it will be shortened to eleven months. The JBOSC is a joint procurement effort between NASA and the Air Force 45th Space Wing to provide unified base support services for KSC, Cape Canaveral Air Station, and Patrick Air Force Base. EG&G Florida, Inc. of Cape Canaveral, FL, has been KSC's base operations contractor since 1983, providing management, operation, maintenance and engineering for KSC utilities, facilities, health, fire, security services and some technical operations. Their current contract was effective Nov. 1, 1993, and has a base period of performance through Oct. 31, 1997. The exercising of this option is within the provisions of the existing contract. [NASA Contract Announcement #C97-s, October 30, 1997.]

October 31:

**LINEAR AEROSPIKE SR-71 EXPERIMENT
COMPLETES SUCCESSFUL FIRST FLIGHT**

A NASA SR-71 today successfully completed its first flight as part of the NASA/Rocketdyne/Lockheed Martin Linear Aerospike SR-71 Experiment (LASRE) at NASA's Dryden Flight Research Center, Edwards, CA. The SR-71 took off at 11:31 a.m. EST. The aircraft flew for one hour and fifty minutes, reaching a maximum speed of Mach 1.2 before landing at Edwards at 1:21 a.m. EST, successfully validating the SR-71/linear aerospike configuration. Linear Aerospike rocket engines are going to power the X-33 Advanced Technology Demonstrator, scheduled to fly in 1999. [NASA News Release #97-251, October 31, 1997.]

TWO MORE MOONS OF URANUS FOUND

Astronomers have discovered two small moons orbiting Uranus, bringing to 17 the number of moons circling the seventh planet. The larger moon measures only 100 miles across, the smaller only 50 miles. Unlike the planet's other moons, they orbit Uranus at a crazy angle, alternately rising high above and then plunging far below the plane occupied by most solar system objects. The discovery was announced by the International Astronomical Union. The moons are yet to be named. Tradition dictates that, like Uranus' other 15 moons, they receive names from Shakespeare or Alexander Pope. [Florida Today, November 1, 1997, p 2A.]

X-33 RECEIVES OK TO PROCEED

NASA admitted Friday that the X-33 space plane will probably not go as fast as planned, but gave Lockheed Martin Corp. clearance for final construction of the \$1 billion craft. Engineers at Lockheed Martin's fabled Skunk Works design shop in California have struggled all year with the weight of the plane, which will be asked to perform unlike anything ever made. The X-33 is the small-scale prototype of a craft that will take off like a rocket, fly into space and return to Earth like an airplane - all without the external fuel tanks or disposable parts that help make the space shuttle so expensive. In testing the concept with the X-33, the National Aeronautics and Space

Administration originally wanted Lockheed Martin to make a craft that could go 15 times the speed of sound, or Mach 15. Now the space agency has decided that it can get by with Mach 134. Even that speed, roughly 8,700 mph, would be four times faster than the official airplane record of 2,193 mph set by an SR-71 Blackbird in 1976. [Florida Today, November 1, 1997, p 7A.]

During October:

LAUNCH COMPUTER TRIALS

Kennedy Space Center has begun testing two new Infinity R/T computer systems on space shuttle mobile launch platforms. The systems are procured from Encore originally by McDonnell Douglas before its merger with Boeing and will now be used to support shuttle payload data acquisition and monitoring operations at Launch Complex 39. The systems have been customized to withstand acoustic and vibration loads during shuttle ignition and liftoff. Kennedy may order as many as six additional Infinity R/T systems, once the initial two complete launch trials. [Aviation Week & Space Technology, October 6, 1997, p 19.]

NOVEMBER

November 1: TITAN ROCKET SPY CRAFT READY TO FLY

After a delay caused by lightning and leaking fuel, a Titan 4 rocket is scheduled to carry a spy satellite in space. The \$350 million rocket is carrying classified cargo for the super-secret National Reconnaissance Office. The launch is to occur tonight between 7:45 and 9:45 p.m. from Cape Canaveral Air Station. Trade publications have identified the cargo as TRUMPET, a high-technology satellite worth nearly \$1 billion. The launch had been set for Friday, but a lightning strike near the launch pad earlier last week forced Air Force officials to recheck the rocket's electrical circuits. Workers also had discovered a small leak in a solid-fuel rocket motor. The leaky part was replaced. [The Orlando Sentinel, November 2, 1997, p A-16.]

SEATTLE COMPANY TAKING RESERVATIONS FOR SPACE TRAVEL

Zegrahm Expeditions is taking reservations for trips on a rocket-powered cruiser that would fly 62 miles above Earth - far enough from the planet's gravitational pull to achieve weightlessness for about two minutes. The Seattle company started taking reservations last month and says it has at least 15 people who have put down a \$5,000 deposit on the \$98,000 trip. Plans call for the voyages to start in 2001, when Zegrahm plans to schedule two departures a week, with six passengers along on each "space experience," said Scott Fitzsimmons, vice president of subsidiary Zegrahm Space Voyages. The National Aeronautics and Space Administration is wary of carrying civilians since the 1986 Challenger explosion that killed seven astronauts - one of them teacher Christa McAuliffe. But there's a burgeoning private industry - and a cash incentive. The St. Louis-based X Prize Foundation is offering a \$10 million prize for the first privately financed operation that will ferry people into space. [Florida Today, November 2, 1997, p 1E.]

November 2: OCTOBER WAS A GOOD MONTH FOR MIR CREW

One month into his stay on the Russian space station Mir, David Wolf is doing full-time science work, something other American astronauts have not been able to do this year. Mir's crew has enjoyed a trouble-free October, allowing Wolf to devote himself to experiments while his two cosmonaut roommates, Anatoly Solovyev and Pavel Vinogradov, are carrying out repairs and doing routine work. [Florida Today, November 3, 1997, p 1A & 4A.]

November 4: SCIENTISTS BID FAREWELL TODAY TO PATHFINDER

NASA scientists will announce today that the remarkable journey of the Mars Pathfinder spacecraft and its tough little rover, Sojourner, is finally over. Controllers at NASA's Jet Propulsion Laboratory in Pasadena, Calif., have not been able to talk to

the duo since Oct. 7. They think Mars' sub-zero temperatures have frozen the radio transmitters. A final attempt to establish contact was made last weekend to no avail, leaving nothing to do but officially sign off. The team now will focus its attention on studying the wealth of data the probes returned, a job that should last through August. By any measure, the Mars Pathfinder was an enormous success. It was the first U.S. probe to land on Mars in more than 20 years, and the first of a new generation of inexpensive NASA robot explorers designed to go from the drawing board to outer space in a few years. It also proved a risky, unorthodox landing method that had the probe encased in giant air bags, which allowed it to bounce to a stop on the cusp of an ancient Martian valley. Pathfinder's July 4 landing captivated the world when it sent back dramatic pictures of the rocky, mountainous surface. The images immediately were placed on the Internet, which made them available to millions of computer users. [Florida Today, November 4, 1997, p 4A.]

STS-87 CREW AT KSC THIS WEEK

The crew of Space Shuttle mission STS-87 are at KSC this week for the Terminal Countdown Demonstration Test (TCDT). The TCDT is held at KSC prior to each Space Shuttle flight providing the crew of each mission opportunities to participate in simulated countdown activities. Tomorrow, the crew will take part in simulated launch day events and enter the orbiter Columbia fully suited for simulated shuttle main engine ignition and cut-off sequences. Following TCDT, the crew is scheduled to depart KSC for their homes in Houston for final flight preparations. Columbia is now targeted for launch on Nov. 19 at 2:46 p.m. [KSC Countdown, November 4, 1997.]

November 5:

WAYWARD BOATS CANCEL LAUNCH

The Air Force will try again tonight to launch a Delta 2 rocket with a military navigation satellite from Cape Canaveral Air Station. Wayward boats in the launch impact area off the coast thwarted a launch attempt Tuesday. The window for the rocket and its \$65 million satellite runs from 7:08 to 7:29 p.m. The Navstar Global Positioning System spacecraft - commonly called GPS - will take the place of an aging satellite. The new GPS will join a constellation of two dozen such spacecraft that provide navigation and tracking information for military and civilian users. [Florida Today, November 5, 1997, p 2A.]

NASA SEEKS MORE MONEY FOR STATION

The first component of the international space station won't be launched until June but project costs are rising at regular intervals, a congressional panel was told Wednesday. Two weeks ago, President Clinton signed legislation giving NASA \$2.3 billion for space station construction in fiscal 1998. But the nation's civilian space agency needs \$200 million more to keep the multinational project from falling even farther behind

and racking up even more unexpected costs, said Wilbur Trafton, NASA's associate administrator for space flight. "We don't want to slip the schedule," Trafton said. "If we (do), the out-year costs will go through the roof," he said. Already aware of the station's precarious budget and schedule, lawmakers on the House Science subcommittee were not pleased to listen - once again - as a contrite NASA manager asked for more money and time. The space agency now estimates the total bill for work being done by The Boeing Co., the station's prime contractor, will be \$817 million more than expected. [Florida Today, November 6, 1997, p 6A. The Orlando Sentinel, November 6, 1997, p A-12.]

NAVIGATION SATELLITE HEADS TOWARD ORBIT

A new military navigation satellite is heading toward its destination in space today after a successful liftoff Wednesday night aboard a Delta 2 rocket. The U.S. Air Force/Boeing Navstar Global Positioning System spacecraft - commonly called GPS - was launched at 7:30 p.m. from Cape Canaveral Air Station into a 10,993 X 100-naut.-mi. transfer orbit inclined 35 deg on Nov. 5 by a Boeing Delta 2 booster. The launch marked the first "all-Boeing" space mission ever flown. It will take about two weeks to reach its orbit 11, 000 miles above Earth. After extending its solar panels and charging its batteries, the \$55 million spacecraft is expected to start working in about 20 days. The flight marked the 28th and final launch of the GPS 2A type spacecraft developed originally by Rockwell International. [Florida Today, November 6, 1997, p 6A. Aviation Week & Space Technology, November 10, 1997, p 29.]

November 6: SCIENCE TEAM AND INSTRUMENTS SELECTED FOR MARS SURVEYOR 2001 MISSIONS

Two robotic spacecraft scheduled for launch in mid-2001 to orbit and land on Mars will carry a descent camera, a multispectral imager, and a robotic rover capable of traversing tens of miles across the red planet's rocky highlands. The Mars Surveyor 2001 missions will follow two other robotic Mars missions to be launched in late 1998 and early 1999. All are part of NASA's long-term, systematic exploration of Mars in which two missions are launched to the planet approximately every 26 months. NASA's Office of Space Science has selected the following investigations for the Mars 2001 Orbiter, due for launch in March of that year, and the Mars 2001 Lander/Rover, due for launch in April. [NASA News Release #97-260, November 6, 1997.]

MORE POWER TO THEM - MIR INSTALLS NEW SOLAR PANEL

The Mir space station was back to nearly full power Thursday for the first time in months after cosmonauts carried out a tricky, six-hour spacewalk to install a new solar panel. The successful mission gave Russian space officials a measure of vindication over critics who doubted their ability to bounce back from a series of mishaps that have dogged Mir all year. The new solar panel brought Mir's power supply almost to

what it was before the space station was rammed by a cargo ship during a practice docking in June. [The Orlando Sentinel, November 7, 1997, p A-10.]

November 7:

TITAN ROCKET LIGHTS UP SKY

A Titan 4A rocket rumbled into the night sky Friday following its 9:05 p.m. liftoff from Cape Canaveral Air Station. The launch was delayed for nearly an hour as crews remedied a technical problem aboard the rocket. The rocket carried into orbit a military spy satellite designed to help America keep track of Russia's nuclear arsenal. The \$1 billion spy satellite is called Trumpet and has an antenna the size of two football fields. The Centaur flew an unusual three-burn profile to place the spacecraft into an initial 55-deg. parking orbit and then a final 63.5-deg. orbit, where it was released. Once in orbit, the nearly 6-ton craft will join two other advanced eavesdropping satellites already on the job. Its orbit, which extends to about 23,000 mi., will allow the spacecraft to monitor communications over high northern latitudes. The launch was originally scheduled for Sunday, but a faulty valve inside one of the solid rocket booster nozzles had to be replaced. [Florida Today, November 8, 1997, p 2A. Aviation Week & Space Technology, November 17, 1997, p 27.]

'GEMINI PROGRAM LED THE WAY'

Space pioneers - astronauts and workers involved with the Gemini program - were honored Friday with the unveiling of a monument at the U.S. Space Walk of Fame in Titusville. The monument - a black granite base engraved with the names of many of those involved in the missions and topped with a 12-foot stainless steel Gemini emblem - was dedicated before a crowd of more than 150. The Gemini program was one of many important steps that helped to propel the space program to where it is today. "The Gemini program led the way," former astronaut John Young told the crowd before officially dedicating the monument. The program operated in 1965 and 1966 as a bridge between the original manned mercury launches and the Apollo missions to the moon. Young flew on Gemini 3. [Florida Today, November 8, 1997, p 1B.]

November 8:

SPACE MEMORIAL DAMAGED

Astronaut Memorial Foundation officials are trying to determine the amount of damage to the memorial Space Mirror at the Kennedy Space Center Visitor Complex. Normally the mirror, which honors fallen astronauts, tilts at 52 degrees. On Saturday morning, it was at 42 degrees. "The mirror tilts and rotates, and it basically tilted further down than it was supposed to," said Jim DeSantis, president of the foundation. "We think it might be fatigue to the metal, but we don't know exactly what happened, so we have to bring in the experts to find out what went wrong. "We don't know how serious the damage is. We know one set of three mirrors that reflect the sun's rays are broken, an area about 4-by-5-feet." The granite slab stands 42½ feet high, is 50 feet

wide and weighs 70,400 pounds, including some 50,000 pounds that move. Its supporting steel work, some of which apparently failed, weighs an additional 250,000 pounds. The monument, which cost \$6.2 million has been stabilized with braces to prevent further damage, DeSantis said. Seen by millions of people every year, the mirror has been roped off until officials can fix the problem. [Florida Today, November 9, 1997, p 2B.]

November 9:

KSC LIAISON IS LINK BETWEEN SPACE, BUSINESS COMMUNITY

Christine Rodgers is NASA-Kennedy Space Center's business liaison in the Office of Engineering Development, Technology Programs and Commercialization, which means she is the link between the space community and the business community. It also means she has quickly become one of Brevard's better-known executives, with an enthusiasm for the job that's matched only by her enthusiasm for her new home. "I'm here only a year," said Rodgers, who transferred last September from NASA's national headquarters in Washington D.C. "But I really like what I'm doing and I like the area in which I'm doing it." In little more than a year, she has become a member of the executive committee of the board of directors of the Economic Development Commission of Florida's Space Coast; a member of the Space Coast Development Commission, and a member of the Cocoa Beach Area Chamber of Commerce and its Small Business and Industry Council, was well being active in the Space Business Roundtable, the Spaceport Florida Authority, the Canaveral Port Authority and Enterprise Florida. She says she wants to make Kennedy Space Center "more accessible, more personal," to the community at large. "It's very important for Kennedy Space Center to be regarded as a partner in the community." [Florida Today, November 10, 1997, p 1D.]

SOARING SECOND CAREER

Former Kennedy Space Center Director Jay Honeycutt is rising fast through the ranks of aerospace giant Lockheed Martin. Honeycutt, who retired in March, was hired in May as executive vice president of Lockheed Martin Space Mission Systems and Services in Houston. Late last month he was promoted to president of the 5,000-employee division, which provides engineering work to NASA. It took Honeycutt 29 years at NASA to become KSC director, but only five months to get an equivalent job at Lockheed Martin. [The Orlando Sentinel, November 10, 1997, p A-7.]

30TH ANNIVERSARY OF SATURN V

Nov. 9 was the 30th anniversary of the first launch of a Saturn V rocket. At lift-off the vehicle produced more than 7.5 million lbs. of thrust, stood more than 360 feet tall and weighed more than 6 million lbs. [NASA Countdown, November 13, 1997.]

November 10:

MARS MAPPING DELAYED 1 YEAR

After a month's delay because of problems with a solar-power panel, Mars Global Surveyor has resumed maneuvers to descend to a mapping orbit of the planet. The spacecraft now is not expected to be in position for its primary mapping operations until March 1999, a year later than planned. Soon after launching, one of the Surveyor's two solar-power wings failed to deploy properly. [The Orlando Sentinel, November 11, 1997, p A-5.]

'SPACE MIRROR' OUT OF COMMISSION FOR ABOUT 2 WEEKS

A monument to fallen astronauts will remain closed until workers can determine how much damage was caused late Saturday when 25 tons of granite slipped out of place. The "Space Mirror," which sits outside the Kennedy Space Center Visitor Center, is likely to be out of commission for at least two weeks. During that time, visitors will not be allowed within 30 yards of the monument, said Jim DeSantis, president of the Astronauts Memorial Foundation. The 50-by-42-foot mirror is designed to illuminate the names of dead astronauts by reflecting sunlight through 93 granite panels. The mirror uses a computer program to track the sun across the sky. The structure's troubles started early Saturday when the giant mirror tilted 12 degrees beyond its normal position. The unexpected shift heavily damaged one set of mirrors used to reflect light. Beyond that, there does not appear to be any major damage to the memorial. "But it's so complex. We don't know what the damage is underneath," DeSantis said Monday. For now, the Space Mirror will be braced with steel beams until an expert can assess the damage. A meeting is scheduled for today to select a company for the task, DeSantis said. The \$6.2 million Space Mirror opened in 1991. It was built with money generated from a license plate commemorating the crew of the space shuttle Challenger, which exploded shortly after launch in 1986. This is the second time there has been a problem with the monument. In 1991, the two engines that tilt the memorial started moving at different speeds, creating enormous stress on the monument. To solve that problem, the computer program was altered so that the system now shuts down if the engines lose synchronization. [The Orlando Sentinel, November 11, 1997, p D-3.]

November 11:

FERRY FLIGHT TO PALMDALE, CA FOR OMDP

Atlantis, riding atop the modified Boeing 747 Shuttle Carrier Aircraft (SCA), departed Kennedy Space Center at 1:53 p.m. today en route to Palmdale, CA, for the planned Orbiter Maintenance Down Period (OMDP). Following a minor problem getting the orbiter mated to the SCA, Atlantis departed KSC from the Shuttle Landing Facility runway 33. Atlantis is scheduled to arrive at Tinker Air Force Base, Oklahoma City, at about 6 p.m. today and remain overnight. Tomorrow, weather permitting, Atlantis will continue on to Palmdale's Orbiter Assembly Facility where it will remain until August 1998. At Palmdale, modifications and structural inspections will be conducted

in preparation for Atlantis' future missions to support International Space Station assembly activities. Atlantis' next flight into space is scheduled to be Space Shuttle mission STS-92, targeted for launch from KSC in January 1999. [Bruce Buckingham. (1997). Kennedy Space Center Space Shuttle Status Report [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [1997, November 11].]

November 12:

NEW PATHFINDER STAMP

Mars Pathfinder, whose mission to the Red Planet riveted Americans' attention this summer, will be commemorated on a postage stamp. Pathfinder attracted a worldwide television audience as it parachuted to the surface of Mars on July 4. The rover provided thousands of pictures and other data until it sent its last set of scientific findings Sept. 27. The lander sent out its last signal Oct 7. The \$3 stamp will be issued Dec. 10 at NASA's Jet Propulsion Laboratory in Pasadena, Calif. [Florida Today, November 13, 1997, p 6A.]

CASSINI PROTESTERS FACE JUDGE TODAY

A preliminary hearing on the Cassini protesters arrested in early October will be heard today in the Brevard County Courthouse in Titusville. Assistant State Attorney Mark McQuagge is expected to file a motion asking County Judge Kenneth Friedland to limit defense options in the case. The protesters were arrested when they trespassed on Cape Canaveral Air Station in opposition to the launch of the Cassini probe. The state's motion will ask Friedland to put something called "a defense of necessity" off limits, said Mark Tietig, defense attorney for some of the protesters. If granted, the protesters would not be able to use this defense: They had to trespass on federal property to prevent danger. Tietig said he and his wife, Lisa Kuhlman Tietig who will argue the case, will ask Friedland to deny the motion. [Florida Today, November 13, 1997, p 3B.]

November 13: TRAFTON ANNOUNCES HIS DEPARTURE FROM NASA

Wilbur C. Trafton, Associate Administrator for the Office of Space Flight at NASA Headquarters, has announced his intention to leave NASA, effective next month. NASA is proceeding with the search for a successor. Trafton has been the space agency's top official for human space flight since March 1996. [NASA News Release #97-264, November 13, 1997.]

November 14: X-33 LAUNCH FACILITY GROUNDBREAKING HELD

Representatives from NASA, the U.S. Air Force and industry broke ground Friday, Nov. 14, at the launch site for the X-33 Advanced Technology Demonstrator during a ceremony at Edwards Air Force Base, CA. The 25-acre launch site is located on the eastern portion of Edwards, a few hundred yards north of what is known as Haystack

Butte. [KSC Countdown, November 18, 1997.]

November 15:

MARS MISSIONS TO CARRY HIGH-TECH EQUIPMENT

Two robotic spacecraft scheduled for launch in mid-2001 to orbit and land on Mars will carry a descent camera, a multispectral imager and a rover capable of traveling miles across the planet's rocky highlands. The Mars Surveyor 2001 missions will follow two other Mars missions - one launch late next year, the other in early 1999. All are part of NASA's plan to explore Mars with new missions launched to the planet about every 26 months. The Mars 2001 Orbiter is scheduled for launch in March of that year, followed a month later by the Mars 2001 Lander and Rover. [Florida Today, November 26, 1997, p 1E.]

STS-87 FLIGHT CREW ARRIVES

The STS-87 flight crew arrived at KSC's Shuttle Landing Facility (SLF) at about 3:15 p.m. yesterday and will undergo routine pre-flight medical exams and final mission familiarization briefings in the days leading up to launch. Commander Kevin Kregel and Pilot Steven Lindsey practiced SLF approaches in the Shuttle Training Aircraft (STA) this afternoon and have an additional STA flight planned for tomorrow evening. [Bruce Buckingham. (1997). Kennedy Space Center Space Shuttle Status Report [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe shuttle-status [1997, November 17].]

November 16:

STS-87 MISSION OVERVIEW

The countdown for mission STS-87 began Sunday at 3 p.m. from Firing Room 3 of the Launch Control Center. STS-87 is the eighth and final space shuttle mission of 1997. This will be the 24th flight of the orbiter Columbia and the 88th flight overall in NASA's space shuttle program. Launch is set for 2:46 p.m. tomorrow. The mission is scheduled to last 15 days, 16 hours, 34 minutes and end with a planned KSC landing at about 7:20 a.m. on Dec. 5. On mission STS-87, Columbia will carry into orbit a six member crew. Once on orbit the U.S. Microgravity Payload experiments will be activated and the Spartan 201 satellite will be deployed on the second day of the mission. Spartan retrieval is slated for flight day four and two days later Mission Specialists Winston Scott and Takao Doi will conduct a six-hour space walk to demonstrate techniques to be used in the assembly of the International Space Station. There is a 60 percent chance of favorable weather, with a chance of showers and clouds in the area at launch time. [KSC Countdown, November 18, 1997.]

November 17:

**U.S., RUSSIA NAME INTERNATIONAL
SPACE STATION CREWS**

The first four crews to live and work onboard the International Space Station (ISS) were named today by both the U.S. and Russian space agencies. The first increment crew consists of American astronaut William M. Shepherd (Capt., USN), the expedition commander; Yuri Gidzenko (Col., Russian Air Force), the Soyuz vehicle commander; and cosmonaut Sergei Krikalev, the flight engineer. All three have previous space flight experience. The crew is training for an early 1999 launch on a Soyuz vehicle for a planned five-month mission on the ISS. Shepherd, Gidzenko and Krikalev will be relieved in the summer of 1999, when the second incremental crew is scheduled to arrive aboard Space Shuttle Atlantis. That crew will be commanded by Russian Cosmonaut Yuri Usachev. He will be joined by American astronauts James S. Voss (Col., USA) and Susan J. Helms (Lt. Col., USAF). All three also have flown in space before. [NASA News Release #97-269, November 17, 1997.]

November 18:

ATLANTIS IMPROPERLY ATTACHED TO CARRIER

Shuttle Atlantis rode atop a jet last week to California with washers missing from two crucial bolts used to hold it in place, NASA officials said Tuesday. The washers were left off bolts used to secure the spaceship to the back of the modified Boeing 747 jumbo jet that flew the shuttle to California for improvements and safety inspections. "That kit, which is associated with holding the orbiter onto the 747, has to be installed correctly to ensure a safe ferry flight," said George Diller, a Kennedy Space Center spokesman. "In this case, some of that apparatus was left out." The bolts, which require two sets of washers, did have one washer each but were missing the second pair. As a result, officials say the bolts suffered minor damage during flight but structurally were sound upon arrival. Nevertheless, United Space Alliance, the NASA contractor that is assuming control over the shuttle fleet operations, is investigating the mistake. Workers for the company were responsible for attaching Atlantis to the plane before it left KSC on Nov. 11. The problem was discovered last weekend when technicians at the Boeing plant in Palmdale, Calif., unloaded Atlantis from the airplane to begin nine months of work on it. During its stay, Atlantis will undergo more than 120 improvements, including an enhanced navigation system that will more accurately pinpoint the vehicle's location in flight. [Florida Today, November 19, 1997, p 1A.]

DOING THE TWIST: COLUMBIA WILL FLIP IN SHUTTLE FIRST

In a space shuttle first, Columbia will roll from belly-up to belly-down - and the crew from heads-down to heads-up - six minutes after liftoff today while traveling at about Mach 13, or 13 times the speed of sound. The twist is designed to put the rocket ship in radio contact with communication satellites. In the past, such a tricky maneuver would have been used only if a shuttle had to make an emergency landing overseas - something never attempted - because of a failed engine or loss of cabin pressure.

NASA can no longer afford its tracking station in Bermuda, which for 16 years has provided uninterrupted communication between Mission Control and ascending space shuttles. Columbia will twist to keep its external fuel tank from obstructing the radio antenna that links the spaceship to NASA's communication satellites. The switchover from Kennedy Space Center tracking station to the satellites should be smooth, with only a momentary gap in coverage. The shuttle normally would switch over to the satellites upon reaching orbit 8½ minutes after liftoff. NASA stressed that the maneuver is safe and has been certified for emergency use ever since Columbia made the first shuttle flight in 1981. If the test goes well, NASA will close its Bermuda station following Columbia's 16-day science mission, saving NASA \$5 million a year. And all shuttles launched toward the east, from then on, will do the twist. [**Florida Today**, November 19, 1997, p 2A.]

November 19:

LAUNCH OF STS-87

The Space Shuttle Columbia launched on time from Kennedy Space Center's Pad 39B today at 2:46 p.m. EST on mission STS-87. The eighth and final Space Shuttle launch of 1997, Columbia's timely liftoff punctuated a year of successful, on-time Shuttle launches. KSC launch managers worked no major technical issues throughout the day's countdown activities. Astronauts on this flight include: Commander Kevin Kregel, Pilot Steven Lindsey, Mission Specialists Winston Scott, Kalpana Chawla, Takao Doi and Payload Specialist Leonid Kadenyuk. [Bruce Buckingham. (1997). **Kennedy Space Center Space Shuttle Status Report** [Online]. Available E-mail: domo@news.ksc.nasa.gov/subscribe/shuttle-status [1997, November 19]. **Florida Today**, November 20, 1997, p 1A & 11A.]

November 20:

SPACE MIRROR HAS NO STRUCTURAL DAMAGE

The 25-ton \$6.2 million Space Mirror monument did not sustain structural damage when its tilting, rotating mirror stopped working two weeks ago, Astronaut Memorial Foundation officials said Thursday. But it is still not known whether the mechanical, electrical or electronic parts in the mirror are damaged. A team of experts will inspect parts this morning to see if the mirror can be safely lifted from the 40-degree angle where it now rests, supported by steel beams. Normally the mirror tilts to a maximum of 52 degrees, but for unknown reasons it passed that spot on Nov. 8 and kept going until it was stopped by an I-beam on the platform below. The Space Mirror, which is in front of the Kennedy Space Center Visitor Complex, uses computers and electrical systems to tilt and rotate so that the sun's rays hit mirrors located on the back of the monument. Those rays are then reflected back through the engraved names of the astronauts. "We have decided to attempt to put the mirror up in a 90-degree position to see if there is any damage we cannot see now," said Jim DeSanits, president of the Astronaut Memorial Foundation, which built the memorial. Once the mirror is in the 90-degree position, it can be further inspected to find what went wrong and how to correct it. [**Florida Today**, November 21, 1997, p 5B.]

November 21: KSC MIRROR REOPENS FOR PUBLIC REFLECTION

The Space Mirror's motors kicked in Friday afternoon and moved the 25-ton monument back up to a 90-degree angle. Friday's maneuver will allow the Astronauts Memorial Foundation to open the monument for viewing today. The memorial to astronauts who died in the line of duty has been off limits at the Kennedy Space Center Visitor Complex since the mirror ground to a halt Nov. 8. About 17 million people have seen the monument - built with money from Challenger license plates and corporate donations - since it was dedicated in 1991. [Florida Today, November 22, 1997, p 1B.]

MERCURY 7 ASTRONAUT INSPIRES STUDENTS

Scott Carpenter's message was simple enough. "Anything you can imagine, you can do, if you work hard enough at it," the Mercury astronaut, pioneering aquanaut and author told an audience composed mainly of students and educators Friday afternoon at ceremonies in the Rocket Garden of Kennedy Space Center's Visitor Complex. Carpenter, the man who made the country's second manned orbital space flight in May 1962, was one of the original Mercury 7 astronauts. He was at the Space Center to help commission the Scott Carpenter Analog Station, a fully functional, manned system that demonstrates concepts of space life to students through NASA's Mission to America's remarkable Students Program. The station's marine missions are analogous to space missions conducted in remote undersea environments. In the mid-1960s, Carpenter joined the U.S. Navy Sealab program and led efforts to transfer space technology into ocean research. "The honor of having this space analog system bear my name is beyond anything I can express to you," Carpenter said. The students, all participants in the MARS program, represented seven Brevard schools as well as other from around the state. Students from Michigan and Oklahoma also are involved in the project, in which 21 classroom telephone links from the ocean floor already have been conducted by crew members. The students were reminded of Carpenter's inspirational qualities by KSC Director Roy Bridges, a former space shuttle pilot, who called the Mercury 7 astronaut "a pioneer and hero of space explorers of all ages...a hero of mine." Carpenter, who signed copies of his book *Deep Flight* at the Visitors Center following the ceremony, said speaking to children about space and undersea exploration is "really about the best thing we can do. Anything like this is important if it gives us the opportunity to speak to kids." [Florida Today, November 22, 1997, p 2B.]

SATELLITE SPINS AWAY FROM SHUTTLE

While a solar satellite tumbles uselessly in space, NASA officials are considering whether to send two astronauts from shuttle Columbia on an emergency spacewalk to rescue the spacecraft. Released Friday from the spaceship, the \$10 million Spartan satellite spun away soon after. The crew tried unsuccessfully for an hour Friday to

retrieve the spacecraft with the shuttle's robot arm. Now NASA officials are leaning toward sending astronauts Takao Doi and Scott Winston out in their spacesuits to grab Spartan so it can be brought back to Earth as planned. The men have been trained for just such an emergency. If carried out, the spacewalk likely would take place Monday. [Florida Today, November 22, 1997, p 1A & 2A.]

November 22:

**DEEP SPACE 1 TO STUDY ASTEROID,
MARS, COMET**

Slowly accelerating through space with a solar-powered engine, NASA's \$141 million Deep space 1 spacecraft will test a dozen new technologies for future missions. DS1, the first in NASA's New Millennium series, is set for launch in July on a two-year mission. The 5-foot-high workhorse will cruise past an asteroid, Mars and a comet, doing scientific work with several compact, lightweight and highly efficient new instruments. Seven members of the science team held a briefing Tuesday to discuss the spacecraft's advanced technologies, including a solar electric propulsion system. In January 1999, the spacecraft will pass within 5 miles of an asteroid named for Christa McAuliffe, the New Hampshire teacher killed by the explosion of the space shuttle Challenger. In April 2000, DS1 will pass by Mars, conducting tests while it uses the planet for a gravity assist maneuver to fling it on a path toward the comet West-Kohoutek-Ikemura. [Florida Today, November 23, 1997, p 6L.]

November 23:

ASTRONAUTS WILL WALK TO NAB SATELLITE

In a bid to snatch a wayward science satellite from orbit, two of shuttle Columbia's astronauts will float outside their ship at 7:16 tonight and wait for just the right moment. When the slowly tumbling satellite comes within reach, astronauts Winston Scott and Takao Doi will try grabbing it together and securing it in Columbia's cargo bay for the ride home next week. NASA officials say the work is tricky, but not unmanageable. The main danger is that the gently twirling satellite could bump into the shuttle or the spacewalkers. "There's always some risk, but I think it's very, very small," said Bob Castle, NASA flight director. "The shuttle is very, very controllable. The crew can put it within a few inches of where they want it to be. I think there's a very good chance that it's going to work." After pondering the walk for three days, NASA officials are eager to put it to work so they can save their \$10 million satellite. Carried into space by Columbia so it could study the sun, the Spartan solar observatory went awry when it was released Friday. After astronaut Kalpana Chawla dropped the craft into orbit from the shuttle's robot arm, it immediately failed to start its programmed maneuvers. When Chawla tried recapturing Spartan, the robot arm nudged the craft and sent it tumbling into space. [Florida Today, November 24, 1997, p 1A & 2A.]

November 24:

RUNAWAY SATELLITE SNARED

With the patience of a spider waiting in its web, spacewalkers Winston Scott and Takao Doi stood in the space shuttle Columbia's cargo bay for two hours Monday night until their prey, an errant satellite, was within arm's reach. With a precisely timed movement, Scott and Doi rescued the satellite and Columbia's wayward mission. They reached over their heads on a cue from Scott and grasped the 3,000-pound Spartan solar satellite. The impromptu spacewalk, planned during the weekend, shows the flexibility of the National Aeronautics and Space Administration. Being able to adapt to problems will be important when NASA begins construction next year of the huge international space station, said John Pike, space policy director for the Federation of American Scientists, a Washington think-tank. [The Orlando Sentinel, November 25, 1997, p A-1 & A-5.]

MIR'S COMPUTER CRASHES; RUSSIANS DELAY REPORT

The Mir space station suffered yet another computer breakdown that knocked out power, but Russian space officials didn't report the problem until Monday - after it was fixed. A new computer was installed Saturday night and Sunday morning, and officials maintained all was well aboard the Mir. As recently as September, the Mir's worn-out computer broke down almost weekly until the U.S. space shuttle Atlantis delivered a new unit. Those breakdowns received worldwide attention in the wake of a June collision with a cargo ship that severely hampered the Mir's functions. The replacement computer had operated faultlessly until the weekend breakdown. [Florida Today, November 25, 1997, p 4A.]

November 30:

NASA WON'T RE-LAUNCH SATELLITE

NASA's solar spacecraft will not get its day in the sun. Officials decided Sunday to forgo a second release of the Spartan spacecraft from shuttle Columbia because the ship's fuel supplies are dwindling as it nears a Friday homecoming. The \$10 million solar observatory was released from the shuttle Nov. 21 but never started its science observations because it did not receive all the computer commands necessary to begin the work. The spacecraft then was set adrift accidentally when the crew tried to grab it with the shuttle's robot arm. It took a spacewalk by astronauts Winston Scott and Takao Doi on Nov. 24 to capture the craft for its return trip home. Checks of the satellite showed it was healthy, however, and Spartan scientists had hoped for a second chance. But in setting the spacecraft free once more, the shuttle would have burned a lot of fuel in deploying and capturing Spartan a second time. Officials said the work would have eaten into reserves needed if the ship has to remain in orbit extra days because of bad weather. Columbia is due back at Kennedy Space Center on Friday. [Florida Today, December 1, 1997, p 1A.]

During November:

SPACE STATION MARKETING

A software program developed by NASA to prepare International Space Station hardware for launch is being spun off into the private sector. Command and Control Technologies Corp. of Titusville, Fla., plans to market the Command and Control Toolkit, an expanded version of the Control Monitor software developed at the Kennedy Space Center. The aim is a product adapted to preparing, launching and operating launch vehicles and orbiting satellites. NASA will receive royalties from a licensing agreement; Command and Control Technologies estimates it will save about \$3 million by adapting the NASA software over what it would have spent to start from scratch. NASA is free to license the Control Monitor software to other companies, which would then compete against Control Technologies. [Aviation Week & Space Technology, December 1, 1997, p 17.]

DECEMBER

December 1: SHUTTLE ASTRONAUTS TO TAKE A 2ND STROLL AROUND SPACE

Two astronauts will leave the space shuttle Columbia early Wednesday in a hastily added second spacewalk to do the NASA equivalent of tying up loose ends. NASA managers late Monday decided to send Winston Scott and Takao Doi into Columbia's cargo bay at 3 a.m. Wednesday to finish tests of spacewalking tools that they didn't complete on Nov. 24. Although mission managers added a spacewalk, they didn't extend the flight. Columbia is set to land Friday at 7:23 a.m. [The Orlando Sentinel, December 2, 1997, p A-7.]

December 1-8: LOOK TO THE STARS FOR A SHOW

The moon and planets will be arrayed in the sky this week in a close display that won't be visible again from Earth for 100 years. Beginning Monday night and continuing through Dec. 8, seven of the planets will appear in the southwestern sky in a line slanting upward from the horizon. From west to southeast, Mercury will be followed by Mars, Venus, Neptune, Uranus, Jupiter and Saturn, with a crescent moon alongside. [Florida Today, December 2, 1997, p 1A.]

December 2: ASTRONAUTS TO TEST ROVING, ROBOTIC EYE

Space shuttle Columbia's astronauts plan to test a \$3 million free-flying camera, called Aercam Sprint, during a second spacewalk early Wednesday. Astronauts Winston Scott and Takao Doi never got around to Aercam Sprint during their first spacewalk on Nov. 24. Padded for safety, the 35-pound sphere - which looks like a soccer ball but is closer in size to a beach ball - was to flit around the open cargo bay, its TV camera peering at the spacewalkers and their tools. The remote-control operator, shuttle pilot Steven Lindsey, planned to fly it at a harmless 3 inches per second. NASA hopes to fly a more advanced model on the international space station to inspect hard-to-reach areas outside. [Florida Today, December 3, 1997, p 5A.]

December 3: ROBOT CAMERA GIVES SHUTTLE A NEW LOOK

Spacewalking astronauts aboard the shuttle Columbia today completed testing space station assembly tools and a high-tech "floating eyeball" that could be a boon to future station crews. In a dramatic one-hour, 16-minute test flight, the "eyeball," a \$3 million robotic camera, slowly wheeled and zoomed about above the shuttle's cargo bay, beaming down spectacular bird's eye-view television shots of the orbiter against the blue-and-white backdrop of Earth. Other tests included a 156-pound space crane and its 17.5-foot telescoping boom. The goal was to test revised techniques for attaching components to the crane to minimize its tendency to flex when a force is

applied. The work went smoothly and engineers said the results will help designers perfect operating techniques before space station construction begins next year. [William Harwood. (1997). *The Washington Post* [Online]. Available WWW: www.washingtonpost.com/wp-srv/WPcap/1997-12/04/061r-120497-idx.html [1997, December 4].]

December 4:

LUNAR PROSPECTOR SPACECRAFT TO ARRIVE AT ASTROTECH TODAY

The Lunar Prospector spacecraft is scheduled to arrive today at Astrotech's commercial payload processing facility in Titusville. The spacecraft, transported by truck from Sunnyvale, CA, is expected to arrive by late afternoon or evening and will be off-loaded and unpacked on Friday. The Athena rocket on which it will be launched, is already erected at Complex 46. Launch is targeted for 8:32 p.m. Jan. 5. [KSC Countdown, December 4, 1997.]

TALK OF LAYOFFS AT KSC IN JANUARY SPARKS RIFT

The company that runs the space shuttle program is telling its workers to prepare for layoffs starting next month because NASA wants to cut this year's space shuttle budget. But NASA is saying the United Space Alliance, the private company it's paying \$1.3 billion a year to run the shuttle, is being "premature" and is taking a suggested goal as a direct marching order. "We gave them a goal. We asked them to take a look at that goal and to come back to us and tell us the impact," NASA spokeswoman Peggy Wilhide said Thursday. "They have not gotten back to us yet...We're not dictating a number. It is not a directive." A key congressman said Thursday he is getting conflicting stories from the chiefs of NASA and the space alliance. He said workers may be getting the warnings about layoffs as part of a negotiation battle between NASA and its contractor. U. S. Rep. Dave Weldon, R-Palm Bay, said United Space Alliance chief operating officer Jim Adamson told him NASA wants to cut \$100 million from this year's shuttle contract. But after that, Dan Goldin, the administrator of the National Aeronautics and Space Administration, told Weldon "there is going to be no reduction like this at all." [The Orlando Sentinel, December 5, 1997, p A-8.]

CLEAR SKIES PREDICTED FOR SHUTTLE'S HOMECOMING

Shuttle Columbia's crew has two chances to land in Florida today with its cache of science experiments and a solar observatory. The shuttle's first opportunity is at 7:20 a.m. at Kennedy Space Center. Columbia will have a second chance at 8:55 a.m. if bad weather thwarts the earlier try. But forecasters expect the skies to cooperate as a cold front pushed through Florida on Thursday, taking rain and clouds with it. [Florida Today, December 5, 1997, p 1A.]

December 5:

SPACE LAB IS BEHIND SCHEDULE

NASA's latest giant space observatory is way behind schedule, millions of dollars over budget and may not have a space shuttle to ride into orbit, NASA revealed Friday. TRW, the company building NASA's \$1.4 billion Advanced X-ray Astrophysics Facility, told the space agency this week that it can't make a promised June 1 delivery date. TRW hopes to ship the observatory to Kennedy Space Center by mid-August. The observatory will augment work done by the Hubble Space Telescope. The delay makes the telescope nearly three months late and ready for launch no earlier than November, and maybe later. With late delivery and NASA's tight launch schedule for the next five years related to the construction of the international space station, the observatory may not have a trip into space in the next couple of years, said a high-ranking NASA source. Columbia, which was supposed to fly the telescope into orbit on Aug. 28, is scheduled to be shipped to California for extended maintenance in November. After that Columbia will not fly again until December 1999, and that's a mission needed to upgrade Hubble. Columbia is the only shuttle that can carry the telescope. NASA's three other shuttles can't accommodate the 46-foot-long observatory because they have air locks in their cargo bays. Those air locks are in place so the shuttles can dock with the Russian space station Mir and later with the space station. The telescope, conceived in the late 1970s, is considered the third of NASA's "four great observatories" that will unearth secrets of the universe at all ends of the electromagnetic spectrum. TRW is working around the clock to speed up delivery but won't ship the observatory if it's not ready, a company spokesman said. [The Orlando Sentinel, December 6, 1997, p A-1 & A-8.]

SHUTTLE LANDS; INQUIRY LIFTS OFF

Shuttle Columbia's crew, mission STS-87, returned home Friday at 7:20 a.m. landing at Kennedy Space Center, completing the 12th landing at KSC, and ending a highly successful year for NASA but facing an investigation into the botched release of a satellite during the mission. An inquiry will begin next week into whether crew erred a computer glitch caused the spartan solar observatory to malfunction after it was placed in orbit Nov. 21, officials said. NASA officials expect Spartan to be unloaded from Columbia early next week. Once it is, it will be impounded. With Columbia home, NASA is turning its attention to next year. The agency has seven shuttle flight scheduled, including two to begin construction of the space station. Two other missions will take shuttles back to the Russian space station Mir to exchange crews. The other three missions will be devoted to scientific research. Officials said this year's achievement of launching eight shuttles - tying a record in the post-Challenger era - is proof the agency safely can meet a busy schedule. [Florida Today, December 6, 1997, p 1A & 2A. KSC Countdown, December 9, 1997.]

December 7:

NASA' GOALS: FAR FROM MOON

Kennedy Space Center is conducting a ceremony tonight to mark the silver anniversary of man's last footfall on the lunar surface. The event will be held at the Apollo/Saturn V Center and will honor Apollo 17 astronaut Gene Cernan. It was December 7, 1972, when Apollo 17 lifted off from Complex 39A with Cernan, Ron Evans and Harrison Schmitt. The sixth successful manned lunar landing return was the last of the Apollo Program. [Florida Today, December 7, 1997, p 1A & 2A. A Summary of Major NASA Launches, KHR-1, July 1980, p V-31.]

December 8:

BALLOON MIGHT FLOAT HUMANS TO MARS

NASA engineers have developed plans to significantly alter the international space station to test exotic hardware for a human expedition to Mars in 2014. Assembly of the \$40 billion station is set to begin in Earth orbit in June after 14 years of planning and countless redesigns. The outpost - backed by 16 nations, including the United States, Russia, Canada and Japan - is to serve as a space-based research laboratory. But now, NASA is looking at plans to ditch one of its two primary research modules to make room for \$100 million inflatable space capsule that would carry astronauts from Earth to the surface of Mars, the trade magazine *Aviation Week and Space Technology* reports today. Two other major changes also are being considered: 1) Using a self-sustaining, life-support system on the space station and the Mars capsule that recycles water and air and provides some food. 2) Testing lightweight, miniature electronics that would lighten the load during a journey to Mars. The prototype module - called TransHabs - would transport astronauts to Mars and provide living quarters on the sub-zero surface of the red planet. It could be ready for flight as early as 2002, the magazine reports. TransHab - to be built at Johnson Space Center in Houston - would be launched into orbit inside a space shuttle's payload bay. Once in space, the module would be inflated like a balloon, extending to twice the size of any other station module. The 10,000-pound TransHab would consist of an 11-foot diameter core, filled with research and life-support equipment, surrounded by a multi-layered outer inflatable shell, the magazine reports. It would replace the Boeing-built Habitat Module scheduled for launch to the station in 2003. Boeing's module was to be a second American experimental housing module on the space station. By replacing Boeing's living module with TransHab, NASA could test the reliability of experimental equipment over long periods of time in space. Approval of the TransHab concept is expected after two sets of engineering reviews, one in March and one next summer. [Florida Today, December 8, 1997, p 1A & 8A.]

FALLEN ASTRONAUT HONORED TODAY

Thirty years to the day after Maj. Robert H. Lawrence Jr. died in the crash of a training airplane, he will be honored today in a ceremony at the Space Mirror memorial. The ceremony, which is open to the public, begins at 2 p.m. at the Space

Mirror in front of the Kennedy Space Center Visitors Complex. The mirror will be positioned northwest toward Lawrence's hometown of Chicago, said Jim DeSantis, president of the private nonprofit Astronaut Memorial Foundation. Among the dignitaries expected to attend include Kennedy Space Center Director Roy Bridges; U.S. Rep. Bobby L. Bush of Chicago; and Assistant Secretary of the U.S. Air Force Rodney A. Coleman. Lawrence, a jet-fighter instructor with a doctorate in physical chemistry, was selected for the Manned Orbital Laboratory program in June 1967. Six months later, he was co-piloting for a student in a F-104 Starfighter when it crashed on a California runway. The other man survived; Lawrence did not. If he had lived, Lawrence would have graduated in 1968 from the space flight training class that included retired astronaut and former Kennedy Space Center director Robert Crippen. The Manned Orbital Laboratory, which involved launching two astronauts in a modified Gemini capsule to see whether they could live and work in space, was canceled before it flew. [Florida Today, December 8, 1997, p 1B & 2B.]

ENDEAVOUR LIFTOFF DELAYED FOR REPAIRS

Next month's flight of shuttle Endeavour to the Russian space station Mir has been delayed at least four days so repairs can be made to the outpost and the American spaceship, NASA said Monday. Liftoff now is set for around Jan. 19 on a mission to pick up astronaut David Wolf and drop off his replacement, astronaut Andy Thomas. The Russians have told NASA officials that before Endeavour arrives, they want to finish three spacewalks to fix the battered station and collect scientific experiments bolted onto its exterior. They also need time to unload an unmanned supply ship scheduled to be launched to Mir from Russia in late December. NASA, meanwhile, is faced with its own repair work on Endeavour. One of the shuttle's cargo bay doors was damaged Saturday when a support structure broke and struck it. The damage is minor and can be fixed in time to meet the new launch date, Kennedy Space Center spokesman Joel Wells said. NASA engineers also are looking at unusual tile damage to shuttle Columbia during its last flight, and want to understand the problem before allowing Endeavour to fly. Columbia returned to Earth on Dec. 5 with 318 dents in its protective tiles - more than twice the 150 usually found. [Florida Today, December 9, 1997, p 1A.]

SATELLITE WILL TRANSMIT DIRECTV TO LATIN AMERICA

A multi-million dollar satellite will begin beaming television shows to Latin American homes in February, thanks to the successful launch Monday of a Lockheed Martin Atlas rocket. The \$250 million mission got under way at 6:52 p.m. when the 15-story Atlas lumbered off Cape Canaveral Air Station and headed toward an orbit 22,300 miles above the equator. The launch was delayed for 15 minutes so weather balloons could be moved from restricted airspace. Hughes Space and Communications Co. built the satellite for Pan-AmSat Corp., the world's leading commercial provider of satellite-based communications services. The mission marked the eighth and final 1997

launch from Cape Canaveral for Lockheed Martin International Launch Services, which markets the Atlas and the Russian Proton rockets. [Florida Today, December 9, 1997, p 4A.]

December 9: ADVANCED X-RAY ASTROPHYSICS FACILITY
DELIVERY DELAYED

TRW Space and Electronics Group, Redondo Beach, CA, has notified NASA that it will be unable to deliver the Advanced X-ray Astrophysics Facility (AXAF) to KSC, on June 1, 1998, as required by contract, due to delays in assembly and testing of the facility. TRW is NASA's prime contractor for the observatory. NASA and contractor officials met at NASA Headquarters in Washington, DC, last week to discuss the issue. While no new delivery date was agreed upon, the agency has directed TRW to develop a plan of action that would show how the contractor can minimize impact to the June 1 delivery. Although a delay in delivery could delay the launch, currently scheduled for August 1998 aboard Space Shuttle Columbia's STS-93 mission, the exact impact is not yet known. [KSC Countdown, December 9, 1997.]

SENATORS BLAST NASA FOR PROGRAM OVERRUNS

Two key Senators blasted NASA Tuesday for letting "continual, unabated" overruns undermine public faith in the agency's ability to manage its multibillion-dollar space station program. Sens. John McCain, R-Ariz., and Bill Frist, R-Tenn., promised hearings early next year to get to the bottom of the problem. McCain is chairman of the Commerce, Science and Transportation Committee, which oversees NASA, and Frist chairs the sub-committee dealing with space. In a bluntly worded letter to NASA Administrator Dan Goldin, the lawmakers expressed support for the program in general, but said the cost problems threaten to do "irreparable damage" to it. NASA has projected that the station general contractor - the Boeing Co. - is \$817 million over budget. The senators' letter, however, quoted a recent *Science* magazine report that the station overrun actually may total \$1.5 billion. [The Orlando Sentinel, December 10, 1997, p A-7.]

December 10: MARS PATHFINDER COMMEMORATIVE STAMP
TO BE ISSUED AT KSC

The Mars Pathfinder, whose mission to the Red Planet attracted a world-wide television and Internet audience last summer, will be commemorated on a postage stamp. The \$3 stamp will be issued first on Wednesday, Dec. 10 at JPL. The second day of issuance will be Thursday, Dec. 11 at KSC. A ceremony featuring Titusville Postmaster Ed Link and Floyd Curington, director, Expendable Launch Vehicles, will be held at 11 a.m. at Spaceport Theater, KSC Visitor Complex. Stamp cancellations will be made after the ceremony. The stamp depicts the Sojourner rover at rest on Pathfinder and is based on one of the first images sent back from Mars. [KSC

Countdown, December 9, 1997.]

JAN. 20 LAUNCH DATE SET FOR STS-89

NASA managers have set Jan. 20 as the new target launch date for Endeavour on mission STS-89. Technicians continue repairs to the orbiter's left payload bay door damaged when a ground support device contacted the door. Repairs not completed in the OPF will be finished on the launch pad. Rollout to the pad is currently set for Dec. 16. The STS-89 Terminal Countdown Demonstration Test has been rescheduled for the week of Jan. 4. [KSC Countdown, December 11, 1997.]

SENATOR GRAHAM ANNOUNCES NEW SPACE INDUSTRY LEGISLATION

U. S. Senator Bob Graham announced new federal legislation designed to support the nation's continued space industry development. Graham discussed his legislation, co-sponsored by Senator Connie Mack, that would amend the Commercial Space Launch Act. The bill will encourage commercial utilization of the International Space Station, enable the use of former ballistic missiles for research missions and direct a study into how the Eastern and Western ranges could support a six-hour launch on demand. Graham made the announcement at a 2:30 p.m. press conference at CCAS in front of Launch Complex 46, the dual-use Navy facility recently modified for commercial launches by the State of Florida. [KSC Countdown, December 11, 1997.]

December 11: COURTHOUSE PACK AT CASSINI TRIAL

Grandmothers, lawyers and peace activists packed a courtroom Thursday as the trespassing trial of a group of Cassini protesters got under way. The 15 defendants hope to convince a six-member jury that fear of a nuclear mishap motivated their Oct. 4 protest at Cape Canaveral Air Station. The Cassini probe, launched Oct. 15 aboard a Titan IV rocket, carried 72 pounds of plutonium as fuel on its trek to Saturn. The case is expected to go to the jury today. [Florida Today, December 12, 1997, p 1B.]

December 12: MORE SPACE LAYOFFS CONSIDERED

A \$100 million shortfall in NASA's budget is forcing the agency and its main shuttle contractor to consider laying off hundreds of workers and mothballing a shuttle launch pad, officials said Friday. The cost-cutting plan is expected to be in place by mid-January, six months before NASA is to begin the most complex job ever attempted in orbit - building its \$40 billion international space station. Senior NASA officials say whatever steps are taken by United Space Alliance - which runs the shuttle fleet - will have to be done in a way that does not jeopardize the ships and their astronauts. "We will not make any arbitrary cuts to the shuttle program that would affect safety," NASA Administrator Dan Goldin said Friday after a speech to the Melbourne-Palm

Bay Area Chamber of Commerce. But he added, "We are holding (the alliance) accountable for giving us the lowest cost and highest level of safety, and we're going to continue to encourage them to do that. The issue is safety at the lowest possible cost." Some members of Congress reacted angrily to the news, saying even the talk of more layoffs could put shuttle crews at risk. "You just don't do business like this with manned spacecraft," said U. S. Rep. Dave Weldon, R-Palm Bay, vice chairman of the House space and aeronautics subcommittee. The financial trouble occurred in late November when NASA told the alliance that its \$1.3 billion contract for the budget year that began Oct. 1 was being cut by as much as \$100 million. A joint venture of Lockheed Martin and Boeing, United Space Alliance is in the second year of a six-year, \$7.2 billion deal that calls for the company to gradually take over shuttle fleet operations from NASA. The idea behind the pact is to save money by allowing a private company - rather than the federal government - to run the shuttle fleet. Doing so is expected to allow NASA to focus on research and development work that could lead to human missions to the moon, Mars or beyond.

What caused the anticipated budget shortfall remains unclear. Alliance officials say NASA underestimated the amount of money that would be required to operate the shuttle fleet in fiscal 1998, which runs through Sept. 30. But NASA managers say the alliance isn't meeting agency targets for shuttle spending cuts. Both sides say the shortfall is not related to cost overruns in the space station program, which are expected to total \$600 million to \$817 million by the time the outpost is completed in late 2003. In any case, the alliance is considering a number of cost-cutting options that include: ■ Laying off 300 to 400 shuttle workers as early as January or February. It is not known whether the job cuts would be made solely at Kennedy Space Center, where the alliance employs about 5,900 workers. The company also employs about 3,200 workers at Johnson Space Center in Houston, and about a dozen at NASA's Marshall Space Flight Center in Huntsville, Ala. ■ Mothballing for a year one of two shuttle launch pads at KSC. NASA had planned to launch three missions each from pads 39A and 39B during the remaining three quarters of the 1998 budget year, including the first U.S. station construction mission in July. Temporarily closing one launch pad would enable NASA and the alliance to save money and still fly the other planned missions. ■ Mothballing for a year one of three shuttle processing hangars at KSC. Doing so likely would force NASA and the alliance to shuffle shuttles between the two open hangars and the KSC Vehicle Assembly Building, where only minimal work can be performed on the ships. The move could allow NASA and the alliance to save money while meeting its launch schedule. Goldin, however, said padlocking the hangar is not an acceptable option.

The alliance already had planned to reduce its work force by 6 percent to 7 percent each year during the period covered under its NASA contract, which runs through 2002. Company officials say such cuts, for the most part, could be managed through normal attrition, which runs at a rate of about 6.5 percent a year. But the cost-cutting measures under consideration would force an additional 300 to 400 layoffs that would

occur as early as January or February, company officials say. Goldin said he doesn't expect the layoffs to be that severe. He said only 250 to 300 workers might face furloughs early next year. No final decision has been made on how many workers might be laid off, or at which company sites the furloughs would occur, he said. One thing, however, is certain - the decisions will be made soon. [Florida Today, December 13, 1997, p 1A & 2A.]

CASSINI PROTESTERS GUILTY OF TRESPASSING

A jury found 15 Cassini protesters guilty Friday of trespassing at Cape Canaveral Air Station during an Oct. 4 rally. Brevard County Judge Kenneth Friedland sentenced each defendant to one year of unsupervised probation. He also required each to perform 300 hours of community service and to pay court costs plus \$70 in sheriff's investigative fees. If the defendants meet those conditions, the judge agreed to withhold adjudication of their guilt. That means the defendants will not have criminal records. The defendants were: Willa Elam, Jerry Bosworth, Bethsheba Lavoie, Margery McIntire, Carol Mosley, Edwin Stapler, Mary beth Sullivan, Lance Turner, William Vannatta, Theresa Beasley, Dorothy Brownold, Arthur Laffin, Richard Ochs, Joshua Rumschlag, Barbara Weidner and Rena Vega. [Florida Today, December 13, 1997, p 1A.]

EG&G, JOHNSON CONTROLS TEAM UP ON BID

For several years, EG&G Florida Inc. has run base operations at Kennedy Space Center. Johnson Controls World Services does the same at Cape Canaveral Air Station and at Patrick Air Force Base. When NASA and the U.S. Air Force decided to combine operations at those facilities into the same contract, it seemed to portend a fierce and potentially bitter bidding war between two corporate heavyweights that employ a combined 3,800 people in Brevard County. Then, the two realized they were better off joining forces. The result is The Launch Support Corp. - a joint venture of EG&G and Johnson Controls as well as Lockheed Martin and ITT Federal Services Corp. It is the first time EG&G and Johnson Controls have worked together. TLS will bid on the \$1.47 billion Joint Base Operations Contract, five years in length with a 5-year extension option worth \$1.8 billion. Bids went out on Friday for the contract, which will be awarded in August. Under the joint contract, 36 percent of contract dollars go to small businesses. Of the amount designated for small businesses, 15 percent goes to small, minority-owned firms and 5 percent is earmarked for women-owned companies. [Florida Today, December 13, 1997, p 14C & 13C.]

December 16:

KSC TO ROLL ENDEAVOUR OUT TO LAUNCH PAD WEDNESDAY

NASA is ready to roll shuttle Endeavour to its launch pad Wednesday (Dec. 17) in the agency's last big piece of work this year before Kennedy Space Center shuts down for

the holidays. Endeavour is scheduled for liftoff Jan. 20 on a mission to dock with the Russian space station Mir, where it will pick up American David Wolf and drop off his replacement, Andy Thomas. Once the ship reaches the pad, work will wind down at KSC as the spaceport closes for routine maintenance on facilities that is done annually over Christmas and New Year's. Meanwhile, workers will stay on the job the next few weeks at Cape Canaveral Air Station readying two rockets for flight next month. A Lockheed Martin Athena 2 is to launch NASA's Lunar Prospector probe Jan. 5 on a mission to map the moon. And a Boeing Delta 2 rocket is scheduled to lift off Jan. 9 carrying a British military communications satellite. [Florida Today, December 16, 1997, p 1B.]

SHUTTLE PROCESSING UPDATE

Technicians, who are preparing Endeavour for rollout to launch pad 39A later this week, worked overnight in the VAB by sanding portions of the external tank's ribbed intertank thermal foam "rind." These operations have been added to the regular workload as a result of unusual tile damage to the Shuttle Columbia during its launch last month. Engineers are investigating a number of possible causes of the damage but one theory is that the ascent dynamics on the tank may have caused pieces of the ET outer skin to break off and contact the underside of the orbiter and cause the damage in question. Sanding operations are intended to remove thermal foam normally located in this area. Repairs must be completed in the VAB as this section of the ET is not accessible when the Shuttle is on the pad. An investigation is proceeding to ensure that a full understanding of what occurred will be available for consideration at the Flight Readiness Review currently scheduled in early January. Endeavour was transported to the Vehicle Assembly Building at about 6 a.m. Friday (Dec. 12) where it was subsequently mated to the external tank. The Shuttle Interface Test is scheduled for completion today. [KSC Countdown, December 16, 1997.]

ORBITING SPACE JUNK COULD CRIPPLE SHUTTLE

A report suggests NASA spend more time trying to lower the risks from orbiting debris. The report issued Tuesday by a panel led by an ex-astronaut says NASA needs to pay more attention to space-junk risks, and work harder to lower them. The National Research Council report noted that, during some shuttle missions, the threat from space junk is even more grave than the risk the shuttle faces during its fiery launch phase. "Although NASA is taking steps to protect the shuttle from orbital debris such as spent rocket bodies, satellite fragments and paint chips, there is still a real risk that a collision could cripple the shuttle or threaten the safety of the crew," said former astronaut Rick Hauck, who chaired the council's panel that produced the report. But NASA's top expert on orbital debris immediately challenged some of the research council's report's chief assumptions and findings - including the notion that the space agency doesn't weigh space junk along with a mission's other major risks. "We provide a risk assessment of critical penetration...before every flight," said

Nicholas Johnson, the agency's chief scientist who studies orbital debris. "I'm responsible for that." Another assertion Johnson challenged was the statement that NASA has accepted an "allowable risk" of one potentially fatal space-junk collision in every 200 missions. NRC report pointed out that was greater than the accepted risk - once in every 248 missions - that the shuttle will critically fail during its launch and ascent to orbit. "The report is in error when it says orbital debris is the single largest risk. That's never been true and it isn't true today," Johnson said. "Clearly the ascent is the largest critical risk." He said the risk of critical damage from space junk varies from mission to mission - depending on a mission's length, orbital path and other factors. Johnson's challenge carries more weight than a knee-jerk NASA response to outside critics. The space agency itself commissioned the National Research Council report, and Hauck's panel relied on NASA for much of the raw data upon which it based its findings. Johnson did not dispute the report's damage assessments. But he said NASA is making improvement, such as shoring up the shuttle's wing edges. [The Orlando Sentinel, December 17, 1997, p A-1 & A-10.]

GALILEO'S NEW MISSION: CHECK OUT EUROPA

Two years after the Galileo spacecraft sent a probe plunging into giant Jupiter's swirling pink and yellow clouds, the craft marked the end of its primary mission and start of an extended mission by zooming in on the frozen Jovian moon Europa. Scientists at the Jet Propulsion Laboratory announced Tuesday that the mission has been reborn as the GEM project, or Galileo Europa Mission. For the next two years, Galileo will swing by Europa eight times, swooping in for close looks at the chopped ice surface that may blanket the only extraterrestrial ocean in the solar system. Following its eight Europa fly-bys, Galileo will round the moon Callisto four times in order to brake and coast in toward the volcanic moon Io. [Florida Today, December 17, 1997, p 5A.]

December 17:

KSC LAUNCH DIRECTOR HARRINGTON TO RETIRE; SUCCESSORS NAMED

Shuttle Launch Director James F. Harrington has announced his retirement effective Jan. 2, 1998. He will be succeeded in the launch director's position by Shuttle Processing Deputy Director David A. King and Process Engineering Director Ralph R. Roe. As the senior member of the Shuttle launch team during the three-day countdown, the launch director makes the final determination to launch. He also oversees prelaunch preparations at the space center, as well as KSC landing operations. Since being named launch director effective Jan. 22, 1995, Harrington has overseen 22 successful space shuttle launches. "The skill and ease with which Jim has managed the countdown process has left a record of which we can all be proud," said Shuttle Processing Director Robert B. Sieck, himself a former launch director. The naming of two people to succeed Harrington will provide needed depth to the launch director function. "To put it in football terms, we want to have more depth on the bench,"

Sieck said, noting that both he and Harrington served as launch director for extended tenures. King will have the assignment for a period of about six months to a year - enough to encompass at least three or four shuttle launches - after which Roe will serve in the position for a similar length of time. The first launch that King will oversee will be STS-89, the eighth Shuttle-Mir docking flight, set to launch in January next year. Assessments will then begin to determine if a third person should also be trained in the position or whether two will be enough. Imposing a time frame on the assignment does not mean King or Roe is serving in an acting capacity. "This is a full-time job," Sieck said. [KSC News Release #223-97, December 17, 1997.]

APOLLO 1 ASTRONAUTS HONORED

President Clinton Awarded Congressional Space Medals of Honor to two of the three Apollo 1 astronauts killed while preparing for a 1967 moon mission. Clinton presented the medals Wednesday to the families of astronauts Edward White II and Roger Chaffee in an Oval Office ceremony. They died Jan. 27, 1967, along with astronaut Gus Grissom - who previously was awarded the medal - when their space capsule caught fire on a launch pad. The tragedy prompted NASA to institute a series of safety reforms. The president praised White and Chaffee as "courageous men who gave their lives in our nation's effort to conquer the frontiers of space." "Though they never got there, astronauts Chaffee, White and Grissom's footprints are on the moon," Clinton said. "Their spirits live on in every successful launch and every safe return. On behalf of a grateful nation, I thank them for their sacrifice." The Congressional Space Medal is the U.S. space program's highest honor. Grissom received the medal in 1978. Clinton approved the awards for White and Chaffee last June. [Florida Today, December 18, 1997, p 2A.]

December 19:

WELDON: 750 KSC JOBS MAY BE CUT

As many as 750 Kennedy Space Center employees might receive pink slips, possibly as early as next week, according to a memo from U.S. Rep. Dave Weldon's office. The memo, which Weldon circulated to Florida's political heavyweights Friday, says United Space Alliance and NASA "are beginning to agree on total job reductions in the range of 600 to 750," and layoff notices are being prepared. Total layoffs at KSC and other Alliance facilities may be as high as 1,200, the memo says. NASA Administrator Dan Goldin said last week that layoffs were being considered in reaction to a \$100 million shortfall in NASA's budget. However, he indicated any layoffs likely would be half of what Weldon was reporting. KSC Director Roy Bridges said Friday he has heard the layoffs will number between 300 and 600. The 750 figure Weldon used "is in the ballpark, but a little bit on the high side from what I've heard recently." A spokesman for the Alliance said he could not confirm or deny Weldon's numbers because no decision had been made on layoffs. "We have a team of management people taking a hard look at the situation to see how we can absorb this," said Jack King, spokesman for United Space Alliance. "Naturally, with a cut like this,

there will be cutbacks. We are looking at what those numbers will be. "There will be no action before Christmas, but we should be in a position to announce our intention in early January." The Alliance employs about 5,900 people in Brevard County, 3,000 in Houston and about a dozen in California. Weldon said his information came from Director of Shuttle Operations Steve Oswald, who could not be reached for comment. [Florida Today, December 20, 1997, p 1A & 2A.]

JAN. ENDEAVOUR FLIGHT DELAYED 2 DAYS

Shuttle Endeavour is securely bolted to its launch pad today, but it won't be taking off to the Russian space station Mir quite as soon as planned. Work on Endeavour in the Vehicle Assembly Building at Kennedy Space Center took longer than expected this week, prompting NASA to delay the first shuttle launch of 1998 two days to Jan. 22. A new launch time has not been set. The decision came Friday, shortly after Endeavour completed its 3.5-mile move from the assembly building to launch pad 39A, KSC spokesman Joel Wells said. This is Endeavour's second delay in two weeks. It originally was targeted for launch Jan. 15. That flight was bumped five days because Russian Space Agency officials said they needed more time to prepare for the shuttle's arrival at Mir. This mission will mark the first time Endeavour has docked with Mir. The shuttle is to ferry NASA astronaut Andy Thomas to the space station for a tour of duty and return David Wolf, who is aboard Mir. [Florida Today, December 20, 1997, p 1A.]

December 20:

NASA CONFIRMS 600 JOBS WILL BE CUT

NASA officials confirmed Saturday that 600 United Space Alliance employees - 10 percent of the Alliance work force in Brevard County - will be laid off starting in mid-January. About 500 of the lost jobs will come from ground operations at Kennedy Space Center and the other 100 from the shuttle logistics depot in the city of Cape Canaveral. The Alliance will ask for people to voluntarily leave the company before making a decision on who will be laid off. U.S. Rep. Dave Weldon said Saturday he learned the number of layoffs during a discussion with Ed Heffernan, NASA's acting associate administrator for legislative affairs. "The numbers they've worked up have to be approved by NASA's safety board," Weldon, R-Palm Bay, said. "So they have to do their own internal safety analysis. But unless that analysis shows they can't let all these people go, (the layoffs) will be in the 600 range." Heffernan was unavailable for comment Saturday. But Roderic Young, press secretary for NASA Administrator Dan Goldin, confirmed the conversation and the number of layoffs. Young also said one shuttle launch pad will not be used during the 1998 budget year. It will be put back into use when shuttles start taking astronauts to work on the international space station. "We'll need that pad then," Young said. [Florida Today, December 21, 1997, p 1A & 2A.]

STATION PARTS COMING TOGETHER AT KSC

Long before it gets into orbit, the \$40 billion international space station is taking shape on the ground at Kennedy Space Center. Three pieces of the station are being prepared for launch at a giant, hangar-like facility for flights aboard NASA space shuttles starting next year. Workers are doing leak tests, electrical checks and examining the exteriors for sharp edges that could rip an astronaut's spacesuit during the many spacewalks that will be needed to build the outpost. "They're doing a very thorough check-out," said KSC spokesman Bruce Buckingham. "We want to make sure they don't see anything that would impact the crew as they are floating around them." The first of the three segments - a hallway that will serve as connector to six station modules - is scheduled to be hauled into space aboard shuttle Endeavour in July. Called Node 1, the \$280-million component is 14-feet long, 16-feet wide and weighs 10 tons. It will be joined with another station component that is set to be launched from Russia in June. The two other components at KSC are smaller segments that will serve as attachment points between the large hallway and adjoining modules. They are to be carried up on future shuttle missions. In all, 33 U.S. shuttle missions and a dozen Russian rocket launches will be needed to raise the station, which will cover an area nearly as large as two football fields 250 miles above the Earth. The first crew - a trio led by American astronaut William Shepherd - is to arrive at the station in January 1999 while construction is underway. By the time the station is complete in 2002, six-person crews will begin rotating through the outpost every six months. [Florida Today, December 21, 1997, p 6E.]

December 22:

LAYOFF TALK HAS NASA RATTLED

A flurry of pre-Christmas layoff talk in the space shuttle program has rattled workers at Kennedy Space Center, infuriated the congressman who represents them, and left shuttle safety experts scratching their heads. NASA, meanwhile, is doing its best to squelch rumors that as many as 600 shuttle workers at KSC will be laid off in January and February - even though top NASA officials were cited confirming that figure over the weekend. Monday was a day of finger-pointing, with U.S. Rep. Dave Weldon, R-Palm Bay, demanding that NASA's shuttle program directors be fired for mismanagement. "The credibility of the NASA officials with me is pretty low at this point," said Weldon, one of the agency's most ardent supporters in Congress. "I don't know when I'm going to ever get the straight scoop from NASA at this point." Weldon insists that NASA officials - including the agency's top liaison to Congress - have confirmed that about 600 KSC layoffs are being planned by United Space Alliance, the private company that is gradually taking over operation of the shuttle. That figure is nearly 10 percent of USA's work force at KSC, and is double the number of job cuts suggested by NASA Administrator Dan Goldin in a speech Dec. 12. Goldin's press secretary, Roderic Young, said Monday that he was misquoted in a newspaper account over the weekend that reported Young had confirmed the 600-layoff figure. "I never said that this was a confirmed number, and I don't believe Ed

[Heffernan, the agency's congressional liaison,] said this is a confirmed number either," Young insisted. Said another NASA spokesman, Brian Welch: "The bottom line is, we don't know what the number is. Period." NASA claims the actual layoff number won't be known until mid-January, after NASA safety experts have had a chance to review the proposed job cuts. USA officials have told employees that layoffs are coming, but also refused Monday to be pinned down on a number. One NASA official characterized the holiday bickering over the extent of layoffs as part of a struggle for leverage that has been going on between NASA and USA since August. NASA has told USA it needs to shave about \$100 million from its \$1.2 billion budget for 1998. The NASA source, who insisted on anonymity, said USA has responded with all kinds of dire scenarios to get NASA to ease its demands. At one point, the private company told NASA as many as 1,400 jobs would have to be cut to reach NASA's budget goals, the source said. Robert Dun, a member of NASA's Aerospace Safety Advisory Panel, called all the layoff talk "yet another distraction, a major distraction" that could have adverse effects on the program. [The Orlando Sentinel, December 23, 1997, p A-5.]

December 23:

LUNAR PROSPECTOR TO BE LAUNCHED
ABOARD ATHENA II JAN. 5

The launch of Lunar Prospector aboard a Lockheed Martin Athena II rocket is scheduled for Monday, Jan. 5 at 8:31 p.m. EST. The launch window is four seconds in duration. Launch will occur from Complex 46 on Cape Canaveral Air Station, Spaceport Florida's new commercial launch pad. Lunar Prospector, built for the NASA Ames Research Center by Lockheed Martin, is a spin-stabilized spacecraft designed to provide NASA the first global maps of the Moon's surface and its gravitational magnetic fields. It will orbit the Moon at an altitude of approximately 63 miles during a one-year mission. [NASA News Release #222-97, December 23, 1997.]

NASA RUSHES SAFETY REVIEW

NASA Administrator Dan Goldin says he will OK layoffs in the space shuttle program only after a special safety review is conducted, but that review is shaping up as a hurry-up job at best. The results of the special review by NASA's Office of Safety and Mission Assurance are due on Goldin's desk by Jan. 16. But Frederick D. Gregory, the top official there, just got the assignment from Goldin last Friday and notified his staff on Monday, safety-office officials said. The review involves assessing the safety consequences of laying off potentially hundreds of managers or hands-on shuttle workers at Kennedy Space Center in January and February. NASA's primary safety concern in cutting shuttle jobs is maintaining the proper "skill mix" among workers responsible for the most critical areas of preparing a shuttle vehicle for launch. Shuttle program managers follow their own safety guidelines as they oversee the shrinking of the shuttle work force. The safety-office's KSC branch, which also

will be involved in the special review, was likewise in the dark Tuesday. One official there noted that they were getting all their information from newspaper reports. However, that KSC safety official added he was confident an adequate review of any proposed layoffs could be done even on such short notice. "I honestly think so," the KSC safety official said. "Is there a plan? Then you go and look at the plan and see if it makes sense." [The Orlando Sentinel, December 24, 1997, p A-7.]

PEGASUS LAUNCHES SATELLITE

A new fleet of small, low-cost satellites designed to transform the personal communications market began to take shape in space Tuesday with the launch of a commercial Pegasus XL rocket. The slender white Orbital Sciences booster was carried about 60 miles off the coast of southeastern Virginia attached to the belly of an L-1011 jet, then cast free at 2:11 p.m. to launch into orbit. Tucked aboard the launcher were eight tiny disk-shaped satellites for the ORBCOMM communications network, envisioned to provide two-way data and massaging services anywhere on the planet. ORBCOMM will use up to 36 satellites circling 512 miles above Earth to link subscribers from around the globe when the service opens for business next spring. Of the four Pegasus rockets launched from the U.S. East Coast, Tuesday's was the third to be staged from NASA's Wallops Flight Facility in Virginia. The first, in 1994, was based at Kennedy Space Center's shuttle landing strip. Pegasus officials say they are planning a return to the Space Coast to launch a Brazilian science satellite next summer from Cape Canaveral Air Station. Other future missions may also be headed Florida's way, they said. [Florida Today, December 24, 1997, p 1B.]

December 29: KSC DRAWS RECORD NUMBER OF VISITORS

The Kennedy Space Center Visitor Complex had its biggest New Year's party ever Monday. Although not officially 1998 for most of us, Monday marked the first day of the visitor complex's fiscal year, and it celebrated by welcoming a record 23,000 guests. Rick Abramson, president and chief operations officer of the company that runs the visitor complex, was hoarse Monday from talking to visitors. "It was unbelievable," Abramson said. "We were within a minute of closing our gates. We're limited on our parking." The previous record of 19,000 visitors was set last year, although the number is unofficial because turnstiles were installed at the center only last week. But Abramson said interest in space has peaked because of the successful Mars Pathfinder and Cassini missions. "Absolutely, those missions have translated into people" who visit the center, Abramson said. "All the positive, exciting things NASA is doing has sparked interest. This is a national treasure." [Florida Today, December 30, 1997, p 1A.]

During 1997: NASA FILLED THE CALENDAR IN 1997

Mars Pathfinder. One of the most watched events of the year occurred 141 million

miles from Earth, as hundreds of millions of people followed the July 4 landing of NASA's Pathfinder spacecraft on Mars, the first landing on the Red Planet since the Viking missions in 1976 and the first every to use air bags to cushion impact on the surface. Shortly after Pathfinder's landing, the Sojourner rover began its own exploration of nearby rocks and other features. The images from both craft were posted to the Internet, where more than 500 million "hits" were recorded by the end of July.

Hubble Servicing Mission -- "New" Telescope for the New Millennium. During five days of spacewalks, astronauts flawlessly performed major maintenance and upgrades to the orbiting Hubble Space Telescope, replacing older hardware with two dramatically improved instruments that are helping astronomers probe the universe in greater detail than ever before. Also this year, Hubble uncovered over 1,000 bright, young star clusters bursting to life in a brief, intense, brilliant "fireworks show" at the heart of a nearby pair of colliding galaxies. The Hubble image of the galactic collision was printed on the front pages of newspapers around the world as well as on the cover of Newsweek magazine.

Shuttle-Mir Goes Forward. In 1997, three U.S. astronauts -- Jerry Linenger, Michael Foale and now, David Wolf -- added to NASA's long duration record aboard Mir and to the Agency's ability to gain experience and knowledge unavailable elsewhere. Despite problems on the Mir, NASA Administrator Daniel S. Goldin concluded that Shuttle-Mir has a thorough review process which warrants continued American participation in the program.

NASA Satellites Provide Best View Yet of El Nino Weather Phenomena. Pacific Ocean sea-surface height measurements and atmospheric water vapor information taken from independent Earth-orbiting satellites, the Upper Atmosphere Research Satellite, the NASA Scatterometer, TOPEX/POSEIDON, and SeaWiFS have convinced scientists of what they had earlier postulated - - a full-blown El Nino condition is established in the Pacific.

Cassini Launches to Saturn. The international Cassini mission left Earth bound for Saturn on Oct. 15 atop an Air Force Titan IV-B/Centaur rocket in a picture-perfect launch above Cape Canaveral, FL. With the European Space Agency's Huygens probe and a high-gain antenna provided by the Italian Space Agency, Cassini will arrive at Saturn July 1, 2004.

X-33 and X-34 Flight Technology Demonstrators Achieve Major Milestones. In 1997, the Agency's quest to reduce launch costs and increase access to space through its Reusable Launch Vehicle Program took a major leap forward. The X-33 technology demonstrator, scheduled to begin flights in mid-1999, successfully passed its critical design review, and the X-34, the smaller and earlier flight demonstrator being developed in parallel with the X-33, successfully passed a design freeze in mid-year.

Galileo Discovers Icebergs on Europa. Images captured during Galileo's closest flyby of Europa on Feb. 20 showed features of the Jovian moon, lending credence to the possibility of hidden, subsurface oceans. The findings generated new questions about the possibility of life on Europa.

Uplifting Year for Aeronautics. To ensure that NASA's work in science and technology sustains U.S. leadership in civil aeronautics and space and improves air transportation system safety, the Agency established technology goals, called the Three Pillars, that will stretch the boundaries of the knowledge and capabilities needed to keep the United States as the global leader in aeronautics and space.

SOHO Sheds New Light on Active Sun. Scientists using the joint European Space Agency/NASA Solar and Heliospheric Observatory (SOHO) spacecraft have discovered "jet streams" or "rivers" of hot, electrically charged plasma flowing beneath the surface of the Sun. These new findings will help scientists understand the famous 11-year sunspot cycle and associated increases in solar activity that can disrupt the Earth's power and communications systems. [NASA News Release #97-281, December 8, 1997.]

APPENDIX A

SPACE SHUTTLE LAUNCHES FOR 1997

January 12: STS-81 - Shuttle Atlantis took off on a mission to Russia's space station Mir. A crew of five taxied astronaut Jerry Linenger to the outpost and then ferried colleague John Blaha back to Earth after a four-month tour of duty on the station.

February 11: STS-82 - Seven astronauts took off two days early on a mission to service NASA's Hubble Space Telescope. Flying aboard Discovery, the crew carried out four spacewalks to install new instruments on the observatory and then conducted a fifth to repair insulation on the \$3 billion telescope.

April 4: STS-83 - Shuttle Columbia carried seven astronauts into orbit a day later than originally planned. The planned 16-day mission was cut to four days when one of the shuttle's three power-producing fuel cells failed on orbit.

May 15: STS-84 - Atlantis blasted off on the year's second mission to Mir. Astronaut Michael Foale replaced Linenger aboard the outpost, becoming the fifth U.S. researcher to work on Mir.

July 1: STS-94 - Columbia took off on a rerun of its shortened April research mission. The shuttle was prepared for flight in just 84 days - a post-Challenger record for NASA.

August 7: STS-85 - Six astronauts were launched on an atmospheric research mission that featured the deployment and retrieval of a German telescope carrier. A prototype of a Japanese robot arm that will be used on NASA's planned international space station also was tested.

September 25: STS-86 - Atlantis headed off for a third 1997 mission to Mir. An international crew of six picked up Foale and dropped off his replacement, astronaut David Wolf.

November 19: STS-87 - Columbia was launched carrying six astronauts on a research mission that featured two spacewalks to test tools and techniques for upcoming construction of NASA's planned space station.

****December 5:** Columbia's touchdown capped another significant first: 1997 will go down in shuttle history as the first year in which every flight ended with a landing at Kennedy Space Center.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE February 1998		3. REPORT TYPE AND DATES COVERED Technical Memorandum 1997	
4. TITLE AND SUBTITLE Chronology of KSC and KSC Related Events for 1997				5. FUNDING NUMBERS	
6. AUTHOR(S) Elaine E. Liston					
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Sherikon Space Systems, Inc. Kennedy Space Center, Florida				8. PERFORMING ORGANIZATION REPORT NUMBER KHR-21	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) National Aeronautics and Space Administration Kennedy Space Center, Florida				10. SPONSORING/MONITORING AGENCY REPORT NUMBER NASA/TM-1998-206957	
11. SUPPLEMENTARY NOTES This Chronology is published to describe and document KSC's role in NASA's progress.					
12a. DISTRIBUTION/AVAILABILITY STATEMENT Unclassified - Unlimited				12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) This document is intended to serve as a record of KSC events and is a reference source for historians and other researchers. Arrangement is by day and month and individual articles are attributed to published sources. Materials were researched and described by the KSC Library Archivist for KSC Library Services Contractor, Sherikon Space Systems, Inc.					
14. SUBJECT TERMS Chronology; Atlantis; Columbia; Discovery; Endeavour; Payloads; Bridges; Roy; Goldin; launches; landings; employees; International Space Station; Space Station MIR; Mars					15. NUMBER OF PAGES
					16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT		

